

**DEPARTMENT OF THE ARMY**

**Headquarters U.S. Army Depot System Command**

**INSTALLATION  
ENVIRONMENTAL ASSESSMENT**

**TOOELE ARMY DEPOT**  
**North and South Areas**

**TOOELE, UTAH**

**JUNE, 1982**

**REVISED NOVEMBER 1984**

## PREFACE

The National Environmental Policy Act (NEPA) of 1969 requires that all federal agencies plan their actions to prevent or eliminate damage to the environment. Department of the Army Regulation 200-2 implements NEPA. It requires preparation of an installation Environmental Assessment (EA) for each Department of the Army installation.

This EA is a summary of all facets of the Tooele Army Depot (North and South areas) which have environmental significance. It is intended to ensure that the enumerated resources in and around the installation are examined, that installation on-base activities are identified, and that the potential impacts of these activities on resources on and off base are plans evaluated. Actions which have an adverse effect are identified so that plans can be developed or changed to minimize or eliminate adverse impacts insofar as possible.

This document is structured to include a detailed description of Tooele Army Depot activities, a description of the environmental setting including both the physical and human environments in the area of the installation, and assessment of environmental impacts. Appendices are included which include detailed inventories of the facilities, flora, and fauna found on the Tooele installation.

## TABLE OF CONTENTS

PREFACE	i
LIST OF MAPS AND FIGURES	iv
LIST OF TABLES	v
I. DESCRIPTION OF THE TOOELE ARMY DEPOT	1
A. Introduction	1
B. History	1
1. North Area	1
2. South Area	6
C. Activities	6
1. Introduction	6
2. Directorate for Administration and Services	7
3. Directorate for Ammunition Equipment	8
4. Directorate for CAMDS	8
5. Directorate for Maintenance	9
6. Directorate for Management Information Systems	10
7. Directorate for Quality Assurance	11
8. Directorate for Resources Management	11
9. Directorate for Supply	11
10. Directorate for Ammunition Operations	12
11. TEAD Tenants	12
11.1 Agency for International Development	12
11.2 Atmospheric Sciences Laboratory Meteorological Team	13
11.3 Defense Property Disposal Office	13
11.4 U.S.A. Communications Comand	13
11.5 U.S. Army Health Clinic	13
11.6 U.S. Army TSARCOM Mobile Rail Shop No. 3	14
11.7 U.S. Army Reserves	14
11.8 U.S. Army Toxic and Hazardous Material Agency	14
D. Buildings and Structures	15
1. Introduction	15
2. North Area	16
3. South Area	23
E. Contaminated Areas	29
1. North Area	29
2. South Area	35
II. ENVIRONMENTAL SETTING	40
A. The Physical Environment	40
1. Geology and Mineral Resources	40
2. Soils	42
3. Topography and Drainage	42
4. Climate	44
5. Air Quality	46
6. Water	51
6.1 Water Resources	51
6.2 Water Quality	52
7. Flora	59
8. Fauna	61
9. Noise	63
B. The Human Environment	67
1. Population	67
2. Housing	72

3. Economic Conditions	73
3.1 Regional Economy	73
3.2 Employment	81
3.3 Personal Income	85
3.4 Taxes	91
4. Land Use	94
5. Transportation	99
6. Energy Use	111
7. Public Services	114
8. Human Health	117
9. Historic and Archaeological Resources	117
10. Aesthetics	120
III. IMPACT ASSESSMENT	121
A. Introduction	121
B. The Physical Environment	122
1. Geology and Mineral Resources	122
2. Soils	123
3. Topography and Drainage	130
4. Climate	132
5. Air Quality	132
6. Water	142
6.1 Water Resources	142
6.2 Water Quality	146
7. Flora	154
8. Fauna	165
9. Noise	176
c. The Human Environment	179
1. Population	179
2. Housing	181
3. Economic Conditions	182
3.1 Regional Economy	182
3.2 Employment	184
3.3 Personal Income	188
3.4 Taxes	191
4. Land Use	195
5. Transportation	201
6. Energy Use	207
7. Public Services	209
8. Human Health	215
9. Historic and Archaeological Resources	216
10. Aesthetics	217
APPENDIX A: FACILITIES AT THE TOOELE ARMY DEPOT	219
APPENDIX B: FLORA AND FAUNA OF THE TOOELE ARMY DEPOT	232
FOOTNOTES	248

## LIST OF MAPS AND FIGURES

Depot Location	2
Vicinity Map	3
Area Map, North Area	4
Area Map, South Area	5
Existing Land Use, North Area	17
Existing Land Use, South Area	25
Contaminated Areas, North Area	31
Contaminated Areas, South Area	37
Geology Map, North Area	41
Geology Map, South Area	43
Precipitation and Prevailing Winds	45
Ground Water	53
Water Quality, North Area	57
Water Quality, South Area	58
Wasatch Front Multi-County Planning District	68
Tooele County Existing Zoning	96
Tooele City Existing Zoning	97
Tooele City Proposed Zoning	101
Highway Network	103
Transportation	107
Topography/Soils, North Area	125
Topography, South Area	133
General Habitat Types and Impacts, North Area	155
General Habitat Types and Impacts, South Area	161
Community Zones, North Area	167
Community Zones, South Area	173

# LIST OF TABLES

1	Hazardous Materials Handled by the Directorate for Ammunition Equipment	9
2	Hazardous Materials Handled by the Directorate for Maintenance	10
3	Detonations by the Directorate of Supply in 1981	12
4	Maintenance and Production Facilities Proposed in the TEAD Master Plan	19
5	Capacity of the Wastewater Treatment Facility at TEAD-N	22
6	Underground Storage Tanks at TEAD-N	24
7	Underground Storage Tanks at TEAD-S	29
8	Contaminated Areas at TEAD-N	30
9	Analysis of Wastewater from the TEAD-N Maintenance Area	33
10	Contaminated Areas at TEAD-S	36
11	Federal Ambient Air Quality Standards	46
12	EPA Prevention of Significant Deterioration Classifications	47
13	Total Emissions Inventory by Source Categories for Salt Lake and Tooele Counties	50
14	State of Utah Water Quality Standards	55
15	Zoonotic Diseases Known to Occur in Tooele Valley	64
16	Population Growth in Utah and the Wasatch Front	67
17	Population in Tooele County, 1979-1980	69
18	Population by Race and Sex, 1980	70
19	Age Distribution, 1982	71
20	Population Projections in Utah and the Wasatch Front, 1980-2000	72
21	Housing Unit Growth in the Wasatch Front	73
22	Building Permit Issuance in Wasatch Front, 1978-1980	74
23	Construction Permits in the Wasatch Front, January-June 1981	75
24	Housing Inventory in the Wasatch Front, 1976	75
25	Projected Household Compared to the 1976 Housing Inventory	76
26	Selected Housing Characteristics in the Wasatch Front, 1980	76
27	Retail Sales Totals 1980 and Percentage Growth 1978-1980	78
28	Agricultural Production for Utah and the Wasatch Front	79
29	Agricultural Production, 1978	80
30	Value of Non-fuel Mineral Production in Utah	80
31	Labor Force and Employment by Place of Residence, 1980	82
32	Employment by Workplace Location and Industry, 1980	82
33	Percentage of Non-agricultural Employment by Industry Group, 1980	83
34	Non-agricultural Payroll Wages, 1980	84
35	Other Major Employers in Tooele County	85
36	Labor Force Participation Rates, 1980	86
37	Labor Force Unemployment Rates, 1980	86
38	Personal Income by Place of Residence, 1979	87
39	Personal Income by Place of Work, 1979	88
40	Percentage Increases in Personal Income by Place of Work, 1978-1979	89
41	1979 Individual Income Tax Returns	89
42	Percentage of Taxpayers by Income Category, 1979	90
43	Poverty Status of Utah Population, 1980 Estimates	90
44	Utah State Tax Revenues, FY 1979-1980	91
45	Assessment Valuations, 1979-80	92
46	Distribution of Property Taxes, 1980	93

47	Millage Levies in Wasatch Front Counties, 1981	93
48	Local Option Sales Tax Collections, FY 1980	94
49	Capacities and Traffic Volumes on Major Highways in Northeast Tooele County	104
50	Traffic Accidents on Highways in Northeast Tooele County	105
51	Existing Airports	110
52	Customers Served and Energy Supplied by the Utah Power and light Company	112
53	Generating Facilities of the Utah Power and Light Company	113
54	Public School Enrollment in Tooele County	116
55	Hospitals/Medical Centers in Tooele and Salt Lake Counties	118
56	Deaths by Major Classification, 1979	118
57	Violent Deaths by Cause, 1979	119
58	Soils - TEAD North	127
59	Pollution Emission Rates at TEAD-N	132
60	Major Stationary Fuel Combustion Units at TEAD-N	135
61	Volatile Fuel Storage at TEAD-N	137
62	Fuel-Fired Stationary Combustion Sources in TEAD-S	140
63	Coal-Fired Stationary Combustion Sources in TEAD-S	140
64	Location and Emission Standards for Generators in TEAD-S	141
65	North Area Well Data	144
66	South Area Well Data	145
67	Water Quality - North Area	147
68	Water Quality - South Area	151
69	Pesticide Usage - 1981 (North and South Areas)	170
70	Percent of Employed Work Force By Ethnic Group	180
71	Percent of Population by Ethnic Group	180
72	Direct and Induced Retail Sales Impact of TEAD Operation	183
73	Percentage of Sales Attributable to TEAD	183
74	TEAD Employment for Selected Years	185
75	TEAD Personnel by Location of Residence, 1981	186
76	Employment Impact of TEAD	186
77	Employment Impact of Depot Closure, 1980 Base Year	187
78	Geographic Distribution of TEAD Payroll	188
79	Current Income Impact of TEAD	189
80	Direct Income Impact of Depot Closure	190
81	Projected Loss of Disposable Income Due to Depot Closure	190
82	Total Disposable Income Impacts of Depot Closure	191
83	Estimated Retail Sales Tax Receipts from Operation of TEAD	192
84	Income Taxes Generated by TEAD Employment	192
85	Impact of TEAD Closure on Sales Tax Receipts	193
86	Impact of Depot Closure on Unemployment Tax Receipts	194
87	Impact of Depot Closure on Income Tax Receipts	194
88	Land Use on TEAD-N	195
89	Land Use on TEAD-S	198
90	Monthly Electrical Consumption and Peak Demand at TEAD, 1978-1980	208
91	Impact of TEAD on School District Expenses	211
92	Property Tax Impact of TEAD	211
93	TEAD Impact on State-Shared Income Tax Receipts	212
94	Federal Impact Aid From TEAD Operations	212
95	Summary of Major Impacts on School Districts from TEAD	213
96	TEAD-Generated School Revenues as Percentage of School Funding	213

## I. DESCRIPTION OF THE TOOELE ARMY DEPOT

### A. Introduction

The Tooele Army Depot (TEAD) is located in north central Utah, as shown on the maps on the following pages. The Army Depot is under one command but consists of two separate areas, North and South. The North Area (TEAD-N) is located in Tooele Valley approximately two miles south of the city of Tooele and 35 miles southwest of Salt Lake City. The South Area (TEAD-S) is located in Rush Valley approximately 15 miles south of TEAD-N.

The North Area comprises 24,732 acres of land and contains facilities for the overall administration of both the North and South areas. The South Area comprises 19,364 acres and is primarily responsible for the storage, maintenance, disassembly, and disposal of chemical munitions. In addition, TEAD administers four other depot activities:

- (1) Fort Wingate Depot Activity at Gallup, New Mexico;
- (2) Pueblo Depot Activity at Pueblo, Colorado;
- (3) Navajo Depot Activity at Flagstaff, Arizona; and
- (4) Umatilla Depot Activity at Hermiston, Oregon.

The functions of these sub-depots are primarily storage, shipping and receiving, maintenance and disposal of assigned commodities.

### B. History

#### 1. North Area

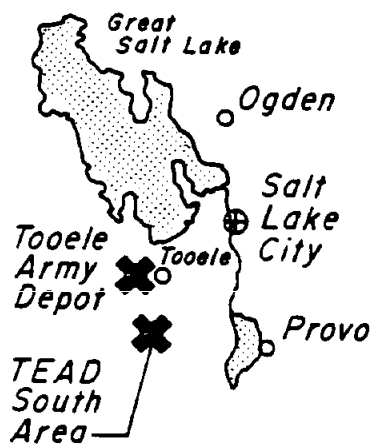
The Tooele Army Depot was established on the North Area site on April 7, 1942 in an area with a deep historical tradition of Indian cultures. Early Desert Archaic Indians inhabited the Tooele Valley and probably portions of the Depot some 11,000 years ago. They were followed by the Late Desert Archaics, the Fremont culture, and the Numic-speaking culture. The Goshute people, who currently inhabit reservations in the surrounding area, are descendents of the Numic-speaking culture.<sup>1</sup>

Between 1826 and 1847, several explorers passed through the valley. James Clyman explored the Great Salt Lake area in Tooele County by boat, seeking a water access to California. Other early explorers included Jedediah Smith, John Bidwell, Captain John Fremont, and Miles Goodyear. Beginning in 1846, the valley was also traversed by several wagon trains.<sup>2</sup> Employees of Brigham Young began grazing stock in Tooele Valley during 1848, and in 1849 the first settlers entered the valley and built a saw mill at Settlement Canyon. Grantsville was settled soon afterward.<sup>3</sup>

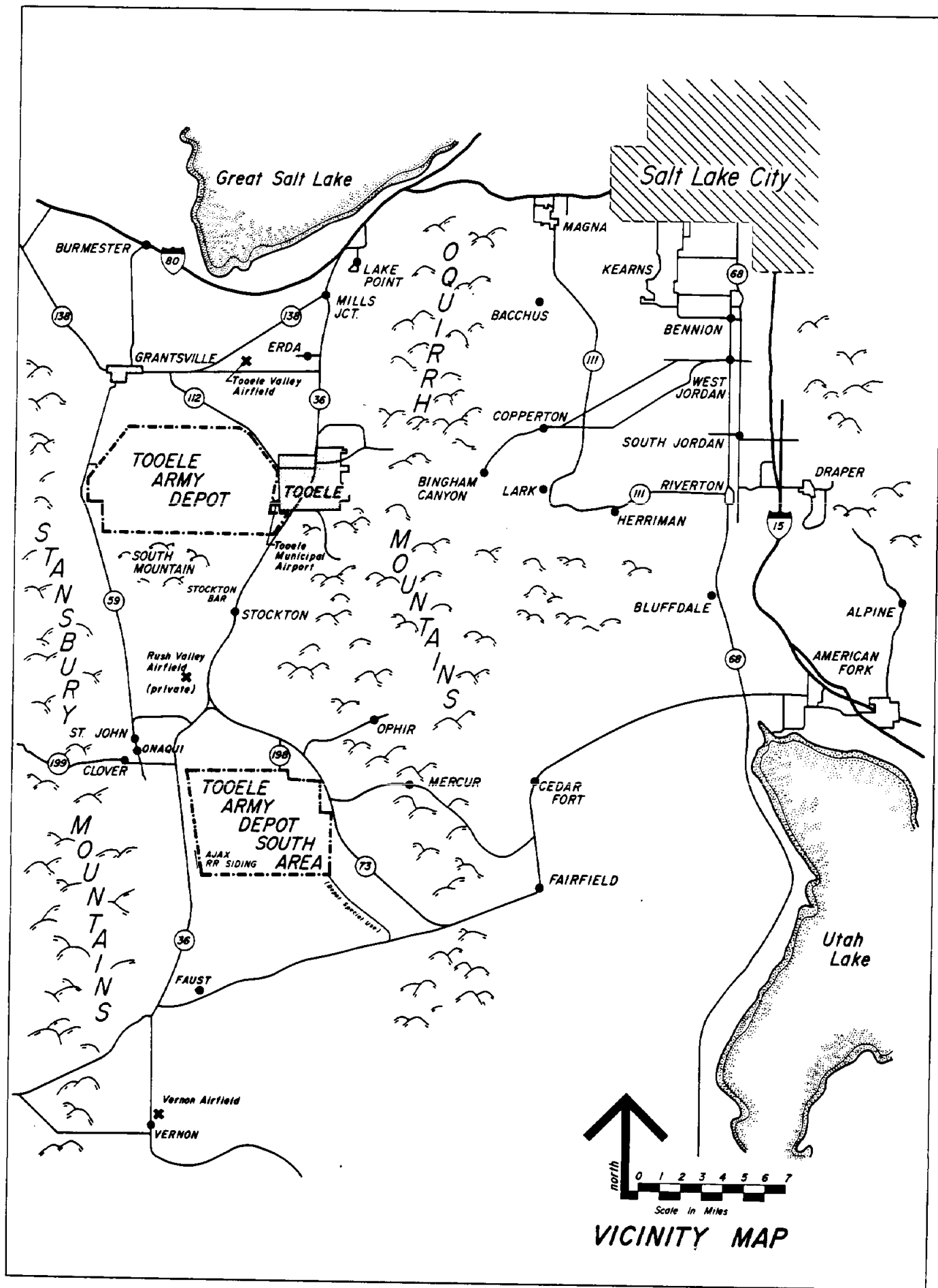
The valley continued to be used for grazing, primarily sheep, and in 1869 when the first railroad entered the valley, agriculture became a major industry. Heavy use of the valley led to overgrazing and within 30 years from the arrival of the first settlers, major portions of the valley constituted a dust bowl.<sup>4</sup>

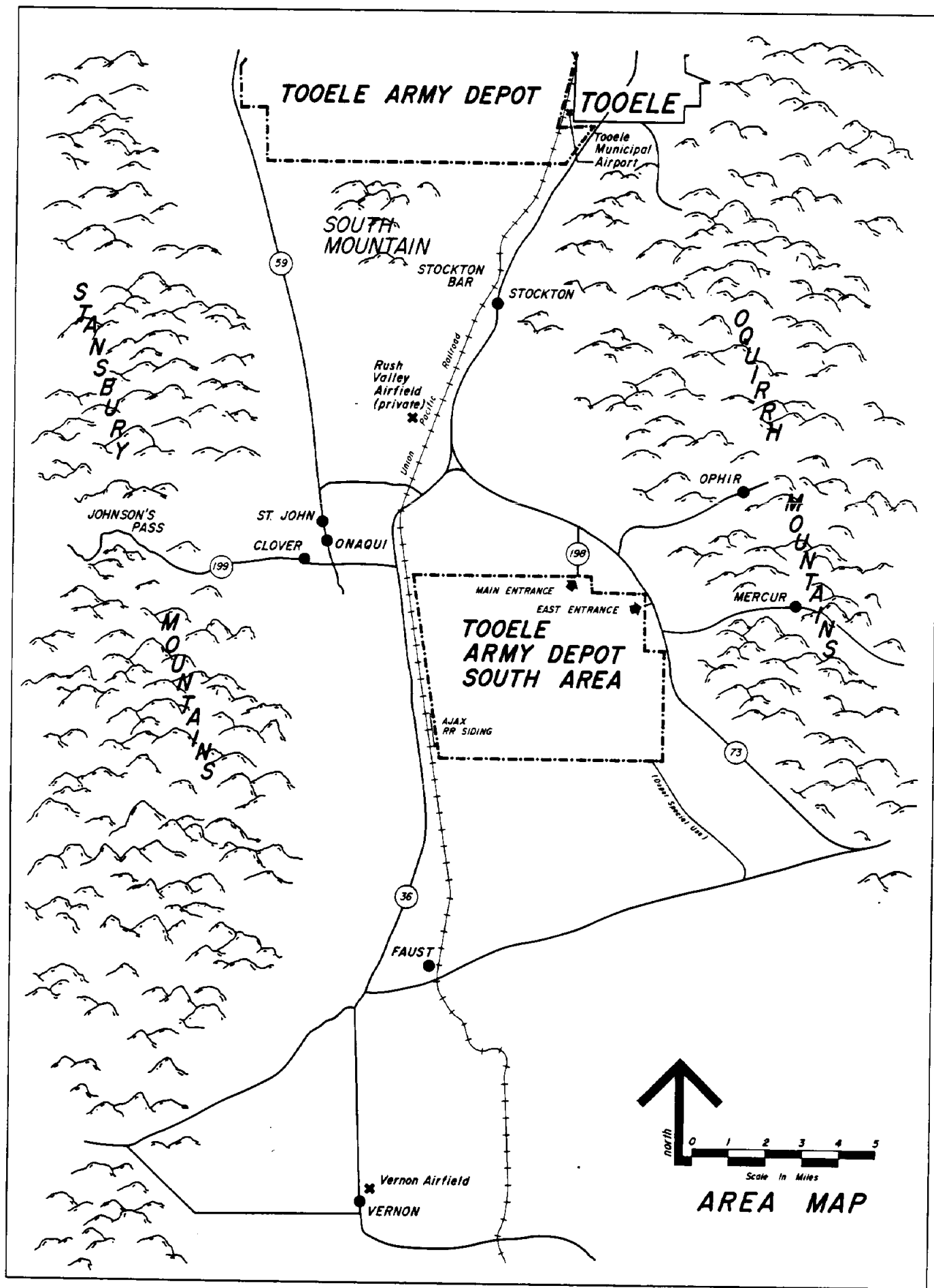
Mining began in 1859 and has played a major economic and environmental role since. The population of miners has varied throughout the years, dependent upon demand and new discoveries. This has resulted in the creation of several "ghost towns" in the area.<sup>5</sup>

STATE OF  
**UTAH**



**DEPOT LOCATOR**





Construction of the Depot facilities was completed in January of 1943. Originally the Depot was known as the Tooele North Area Ordnance Depot, which functioned as a storage depot for World War II supplies, ammunition, and combat vehicles. In 1949 the Tooele Depot assumed command of the Ogden Arsenal; in 1955 the Ogden Arsenal was discontinued and its mission was transferred to Tooele. In the same year the Tooele Depot assumed command of the Deseret Chemical Depot (TEAD-S), which was redesignated a Depot activity. In 1961 the Seneca Arsenal (California) and the Mount Rainier Ordnance Depot (Washington) were deactivated and their missions were transferred to Tooele. In 1962 the Depot was redesignated the Tooele Army Depot. Since 1966 TEAD-N has been assigned the responsibility for eight tenant units, including an annual U.S. Army Reserve Training program.

During the 1970s a number of other functions were centralized at Tooele. In 1979 TEAD-N assumed maintenance mission responsibilities for topographic equipment, troop support items, construction equipment, power generators, and serviceable assets, from the Granite City Army Depot (Illinois), which was subsequently closed. Finally, the four other depot activities which Tooele currently administers were brought under Tooele command: Umatilla in 1973; Navajo and Fort Wingate in 1975; and Pueblo in 1976.<sup>6</sup>

## 2. South Area

The early history of Rush Valley is similar to that of Tooele Valley. Rush Valley was settled in the early 1850s and the valley supported a large population of livestock, including herds of Texas longhorns which were wintered there on drives to California. Dry land farming also played a major role in the earlier days of settlement, but its importance diminished rapidly after the agricultural depression of 1930-35.<sup>7</sup>

The TEAD-S installation was originally the Deseret Chemical Depot, a Class I Chemical Corps Installation, which was established in 1942. In 1943 construction was completed and its mission involving the storage and maintenance of chemical munitions began. In 1955 the Deseret Chemical Depot was redesignated as a Depot Activity and assigned to the Tooele Ordnance Depot. The Depot Activity was discontinued in 1962 and the installation became part of Tooele Army Depot and was designated as the South Area.

## C. Activities

### 1. Introduction

Today the Tooele Army Depot is one of the major ammunition storage and equipment maintenance installations in the continental United States. In 1981 it employed 4,137 persons, including 4,065 civilians and 72 military personnel, and is the major employer in Tooele Valley.

Activities at the Depot are the responsibility of nine Depot directorates:

- (1) Directorate for Administration and Services
- (2) Directorate for Ammunition Equipment
- (3) Directorate for Chemical Agent Munitions Disposal System (CAMDS)
- (4) Directorate for Maintenance
- (5) Directorate for Management Information Systems

- (6) Directorate for Quality Assurance
- (7) Directorate for Resources Management
- (8) Directorate for Supply
- (9) Directorate for Ammunition Operations

The Tooele Depot also provides space for eight tenants:

- (1) Agency for International Development
- (2) Atmospheric Sciences Laboratory Meteorological Team
- (3) Defense Property Disposal Office
- (4) U.S.A. Communications Command
- (5) U.S. Army Health Clinic
- (6) U.S. Army TSARCOM Mobile Rail Shop No. 3
- (7) U.S. Army Reserves
- (8) U.S. Army Toxic and Hazardous Material Agency

Each of the directorates and tenants is described briefly in the pages that follow. More detailed information relating to functional activities of the directorate is provided in Appendix A to this report.

## 2. Directorate for Administration and Services

The Directorate for Administration and Services employs 684 personnel. Of these, 668 are civilian and 16 are military. The Directorate's payroll for 1984 was \$19,739,926.92.

The Directorate for Administration and Services is responsible for planning, direction, coordination, and review of the Adjutant Division, Depot Equipment Division, Facilities Engineering Division, Procurement Division, Small Business Advisor, Family Housing, Bachelor Housing (excluding troop barracks), Reserve Forces Training Office, Personal Services Program (A/DA), Installation Club Management, and Chaplain Activities. The directorate provides administrative and logistical support to the Civilian Personnel Officer, Safety Director, Security Division, Surety Officer, Depot Inspector, Attorney Advisor General, EE00, and the Public Affairs Office, and associated functions.

The Mobile Equipment Branch of the Directorate for Administration and Services is responsible for repair and maintenance of all Depot vehicles. A total of 337 Depot vehicles are currently maintained by the Mobile Equipment Branch. Of this number, 149 vehicles are assigned for use by the Directorate for Administration and Services.

Functions of the Directorate for Administration and Services require the use of some hazardous materials. The Utilities Branch Heating Section utilizes several hazardous chemicals in its operation. Morpholine and cyclohexylamine are added to water used in steam generation. These chemicals protect pipes from corrosion by neutralizing acids normally found in the steam. Large amounts of process steam are used in steam cleaning operations and approximately 15 ounces of each of these chemicals are used daily. Small amounts of sodium hydroxide are used periodically for boiler cleaning in boilers that use hard water. The Mobile Equipment Branch also uses some hazardous materials and generates some hazardous wastes. Hazardous materials include about 200 gallons per year of battery electrolyte, which contain sulfuric acid, and 500 feet per year of asbestos for brake linings.

### 3. Directorate for Ammunition Equipment

The Directorate for Ammunition Equipment employs 105 personnel including 101 civilians and 4 military person. The annual payroll for 1984 was \$2,807,443.74.

This Directorate is responsible for the design, development, testing, manufacture, and procurement of ammunition peculiar equipment. The Ammunition Equipment Directorate also performs tests for ammunition demilitarization renovation or recycling systems for explosive and chemical munitions. Ammunition Equipment formulates APE systems requirements based on using agency input and recommendations for APE program approval. It also performs instrumented/non-instrumented explosive tests to determine munition sensitivities, barricading requirements, and effectiveness for pressure and fragments. Currently 11 motor vehicles are assigned to the Directorate for Ammunition Equipment.

Due to the nature of its mission, the Directorate for Ammunition Equipment routinely handles hazardous materials such as explosives and chemical munitions. The listing in Table 1 summarizes the use and disposal of these substances.

### 4. Directorate for CAMDS

The Directorate for CAMDS (Chemical Agent Munitions Disposal System) currently employs 170 personnel, including 168 civilians and 2 military person. Annual payroll (1984) is \$6,993,999.21.

This Directorate is responsible for planning, scheduling, budgeting, coordination, and review in order to execute the various elements of the Tooele Army Depot Chemical Agent Munitions Disposal System. This includes the piloting and testing of new and unique demilitarization processes, as well as the maintenance of the CAMDS facility, which is the dominant operation in the South Area. Currently 20 motor vehicles are assigned to the Directorate for CAMDS.

The Directorate for CAMDS handles large volumes of hazardous chemicals. CAMDS is currently processing agent GB used in chemical munitions. The agent is decontaminated by processing with sodium hydroxide and other chemicals. A relatively non-toxic brine is formed during the decontamination process. The brine is then dried leaving a salt residue which is placed in plastic-lined cardboard containers and stored in a secure storage facility in the South Area. Hazardous materials usage by CAMDS in decontamination of chemical munitions from September 10, 1979 through January 1, 1982 included 163,000 pounds of agent GB and 25,000 gallons of sodium hydroxide. The wastes produced included 237,558 pounds (1,014 barrels) of agent salts; 557,204 pounds (1,855 barrels) of waste salts; and 341,297 pounds (931 barrels) of non-toxic salts. Inorganic waste salts are disposed at an E.P.A. approved disposal facility.

TABLE 1  
HAZARDOUS MATERIALS HANDLED BY THE  
DIRECTORATE FOR AMMUNITION EQUIPMENT

<u>Material</u>	<u>Rate of Use</u>	<u>Disposal</u>
Explosives; black powder, TNT, pyrotechnics, tear gas, signal smokes, etc.	Small amounts: tests 30 to 40 days per year	Burned in Test incinerator
Sulfuric Acid	100 gallons in 1980; none in 1981	Converted to ammonium sulfate and sold as commercial fertilizer
O-Chlorobenzylidenemalonitrile (tear gas)	160 pounds in 1980; none in 1981	Converted to ammonium sulfate and sold as commercial fertilizer
Hexachloroethane, Zinc Oxide, Aluminum Powder (components of M5 smoke pot)	10 M5 smoke pots in 1981	Chemicals sold after separation
Pentachlorophenol (PCP)	None in 1981	Burned in incinerator to test as a disposal method
Organic Solvents		Burned in incinerator

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In the future, CAMDS may decontaminate agent VX. The process will be similar to that used in decontamination of agent GB, however, large amounts of chlorine and hydrochloric acid will be utilized instead of sodium hydroxide. A waste salt will be produced and handled in a manner similar to the agent GB salts.

CAMDS monitoring and analysis branches require small amounts of agents GB, VX, and HD as well as common laboratory acids, bases, and organic solvents to develop standards used in monitoring chemical munitions storage areas for leakage. Waste chemicals are decontaminated at the CAMDS site.

#### 5. Directorate for Maintenance

The Directorate for Maintenance currently employs 1,663 personnel, including 1,648 civilians and 15 military personnel. Total 1984 payroll was \$44,887,130.13.

This Directorate is responsible for planning, implementation, coordination, and review of the repair, reconditioning, overhaul, rebuild, modification, conversion, and testing of materials and components in the following commodity categories: automotive equipment, combat vehicles, construction equipment, missile systems, conventional fire control equipment,

power generating equipment, rail equipment, general equipment, topographic and reproduction equipment, and assigned commodity groups. The Directorate for Maintenance is currently assigned 22 motor vehicles.

Large volumes of potentially hazardous chemicals are used in maintenance operations at TEAD. Table 2 outlines the types of materials used and methods of disposal.

TABLE 2  
HAZARDOUS MATERIALS HANDLED BY  
DIRECTORATE FOR MAINTENANCE

<u>Hazardous Materials</u>	<u>Use</u>	<u>Amount</u>	<u>Disposal</u>
Trichloroethane	Vapor degreaser or solvent cleaner	3,000 gal/yr	1
Methylene Chloride (Pem 34)	Paint stripper	3,000 gal/yr	1
Sulfuric Acid Solution	Battery electrolyte	2,500 gal/yr	1
Sodium Hydroxide	Cleaning fuel tanks and radiators	10,000 gal/yr	1
	General corrosion cleaner	30,000 gal/yr	2
Phosphoric Acid	Rust remover	2,000 gal/yr	1
Hydrochloric Acid	Fuel tank cleaner	200 gal/yr	1
F Type Corrosion - removing compound	Paint stripper	10,000 gal/yr	1
Nitric and Chromic Acid Smut-GO	Aluminum cleaner	3,000 gal/yr	1
Turcoat Accelagold	Aluminum protecting coating	3,000 gal/yr	1

Key to Disposal Methods:

- 1 - Turn into Defense Property Disposal Office.
- 2 - Neutralize prior to disposal in wastewater system.

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## 6. Directorate for Management Information Systems

The Directorate for Management Information Systems (DMIS) currently employs 93 personnel, including 97 civilians and 2 military person. Annual payroll for 1984 was \$2,335,216.08.

This Directorate is responsible for planning, directing, and executing information concepts, objectives, policies, projects, systems, and methods required to ensure achievement of completely integrated management information and data systems for the Depot. Management Information Systems provides operational and management information to support Depot operations and activities and manages the development and implementation of automated systems

which are, as a whole or in part, oriented toward business, scientific, and engineering applications. At this time two motor vehicles are assigned to the Directorate for Management Information Systems.

This Directorate utilizes some potentially hazardous chemicals in reproduction equipment. Used datagraphix fluid is generated at an annual rate of approximately 50 gallons. Disposal is done by the Defense Property Disposal Office.

#### 7. Directorate for Quality Assurance

The Directorate for Quality Assurance employs 221 personnel, including 242 civilians and 5 military person. Payroll for 1984 was \$7,019,334.86.

This Directorate is responsible for planning, directing, and coordinating inspection, quality assurance, quality control, and calibration programs in support of Depot missions for the receipt, storage, maintenance, and issue of material, including ammunition and special weapons. This assures the Depot Commander that quality products and services are provided by activities within the Depot complex. The Directorate for Quality Assurance also administers the Depot's Value Engineering and Zero Defects programs and provides inspection quality control and quality assurance support to other Department of Defense agencies, the U.S. Army, and Depot Activities, as directed. A total of 19 motor vehicles are assigned to the Directorate for Quality Assurance.

No hazardous materials are used and no hazardous wastes are generated by the Directorate for Quality Assurance.

#### 8. Directorate for Resources Management

The Directorate for Resources Management currently employs 130 personnel, including 127 civilians and three military personnel. The 1981 payroll was \$2,638,018.85.

The Directorate for Resources Management serves as the Depot's financial manager. Primary responsibilities include assisting the Commander in the management of financial resources with the administrative control of funds, including the maintenance of appropriate fund control procedures. Resources Management also provides programming, budgeting, financing and accounting management review and analysis, and industrial engineering services. Only one motor vehicle is assigned to the Directorate for Resources Management.

No hazardous materials are used and no hazardous wastes are generated by the Directorate for Resources Management.

#### 9. Directorate for Supply

The Directorate for Supply currently employs 632 personnel, including 483 civilians and 23 military personnel. Payroll for the Directorate in 1984 was \$17,770,631.21.

The Directorate for Supply is responsible for planning, directing, and coordinating Depot activities concerned with receipt, storage, preservation, and shipment of mission stocks and Depot operating supplies and transportation management services. The Directorate for Supply is assigned 91 motor vehicles.

## 10. Directorate for Ammunition Operations

The mission for the Directorate for Ammunition Operations includes the shipping, maintenance, storage, renovation, and demilitarization of explosives, ammunition, and toxic chemical munitions. A deactivation furnace is used to demilitarize a variety of small-arms ammunition. The furnace is equipped with a modern scrubbing system to reduce emissions and baghouse to collect the inert residue dust. The Directorate conducts operations involving toxic chemical ammunition to include storage, on depot transportation, maintenance, uploading and support and disassembly to CAMDS and Ammunition Surveillance programs.

The Directorate's Ammunition Division conducts open burning of burnable refuse that may be contaminated with explosives. It also performs open detonations 15 to 30 times per year. Detonations and open burning are performed only under ideal weather conditions, including wind from the north, an air quality index rating of 500 or better, and absence of inversion. In 1981 detonations were conducted on eight days, as shown in Table 3.

TABLE 3  
DETONATIONS BY THE DIRECTORATE OF SUPPLY IN 1981

<u>Date</u>	<u>Time</u>	<u>Explosive Type</u>	<u>Weight</u>
1/05/81	10:50 a.m.	Adapter Cluster Bombs	352 lbs.
1/05/81	2:45 p.m.	Adapter Cluster Bombs	2,816 lbs.
1/06/81	11:00 a.m.	Tritional Bombs	2,000 lbs.
1/06/81	3:10 p.m.	Tritional Bombs	4,000 lbs.
1/06/81	3:10 p.m.	Adapter Cluster Bombs	1,056 lbs.
2/10/81	10:30 a.m.	Adapter Cluster Bombs	352 lbs.
2/10/81	3:00 p.m.	Adapter Cluster Bombs	3,168 lbs.
3/27/81	2:00 p.m.	Adapter Cluster Bombs	351 lbs.
3/27/81	3:00 p.m.	Adapter Cluster Bombs	1,404 lbs.
3/30/81	10:20 a.m.	Adapter Cluster Bombs	365 lbs.
5/28/81	11:15 a.m.	Adapter Cluster Bombs	362 lbs.
5/28/81	3:00 p.m.	Adapter Cluster Bombs	1,408 lbs.
5/29/81	10:30 a.m.	Adapter Cluster Bombs	352 lbs.
5/29/81	3:00 p.m.	Adapter Cluster Bombs	3,168 lbs.
9/11/81	12:45 p.m.	Adapter Cluster Bombs	353 lbs.

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## 11. TEAD Tenants

### 11.1 Agency for International Development

The Agency for International Development (AID) currently employs two personnel with an annual payroll of \$59,000.00. The Agency was assigned to the Depot on July 1, 1967 in accordance with an interservice support agreement between TEAD and Region 3 of the AID at Sharpe Army Depot. This Agency screens items that may be required for the AID program. Post Office facilities in Salt Lake City are used for AID offices. At present no Depot vehicles are assigned to AID. The Agency generates no hazardous wastes.

## 11.2 Atmospheric Sciences Laboratory Meteorological Team

The ASL Meteorological Team assigned to the Tooele Depot South Area currently has 14 military personnel and no civilians. The annual payroll is approximately \$209,000.00.

The ASL Meteorological Team provides meteorological services in support of the U.S. Army Demilitarization and Detoxification Program at the Tooele Army Depot and provides meteorological support as required for other R.D.T. & E. activities in the Tooele area. The activity is currently providing support to the CAMDS perimeter monitoring network for the Depot's South Area. In addition, the ASL Meteorological Team sponsors a Chemical Surety Program for the Depot with hourly weather observations provided to the South Area. This activity is currently assigned three Depot vehicles.

The ASL Meteorological Team uses small quantities of a variety of chemicals in its air monitoring procedures and generates some hazardous wastes. Used chemicals are placed in steel drums with plastic liners and disposed of through the Defense Property Disposal Office. The monitoring of  $\text{NO}_2$  requires the use of tartaric acid, sulfamilamide, nathtol-36-disulfonic acid, disodium salt, ethylenediamine, dhydrochloride, and sodium nitrate. The monitoring of  $\text{SO}_2$  requires the use of hydrochloric acid, mercuric chloride, sodium chloride, sulfamic acid, formaldehyde, pararosaniline, and sodium-metabisulfite.

## 11.3 Defense Property Disposal Office

The Defense Property Disposal Office (DPDO) employs 27 civilians with an annual payroll of approximately \$535,284.00. No military personnel are used by this office, which is responsible for all property disposal functions at TEAD. The DPDO coordinates the sale, recycling, and disposal of Depot refuse. It is assigned no Depot motor vehicles. Most of the disposal of hazardous waste for TEAD is accomplished by the Defense Property Disposal Office, which collects the wastes and coordinates their recycling or disposal.

## 11.4 U.S.A. Communications Command

The USACC currently employs 33 civilians. No military personnel are assigned to the Communications Command. Annual payroll for 1981 was approximately \$714,000.00.

This activity is responsible for all Depot communications, operating a communications center 16 hours per day Monday through Friday and eight hours on Saturday. The USACC is a member of the Automatic Digital Network (AUTODIN). USACC also performs all maintenance of Depot communication systems. This activity is assigned eight Depot motor vehicles.

USACC does not utilize any hazardous materials or generates any hazardous wastes.

## 11.5 U.S. Army Health Clinic

The Depot Health Clinic employs 34 personnel, including 43 civilians and 3 military personnel. Annual payroll is approximately \$372,000.00.

The clinic is responsible for providing emergency first aid, administering the Depot's occupational health program for civilian employees, and providing medical and optometry support to active and retired military personnel and their dependents. The Health Clinic is assigned eight Depot motor vehicles.

Contaminated materials such as spent needles, blood serum, used pipets, reaction cups, test tubes, etc. are generated daily by the health clinic. Approximately two 30-gallon plastic bags are collected each week and disposed of by burning in a coal-fired furnace located in the South Area.

#### 11.6 U.S. Army TSARCOM Mobile Rail Shop No. 3

The Mobile Rail Shop currently employs 8 civilian personnel and no military personnel. The payroll for 1981 was approximately \$160,115.45.

This activity provides direct and general maintenance support for Army rail equipment users, including Army Reserve and other defense and federal users. The service area of Mobile Rail Shop No. 3 includes the states of Utah, Arizona, Alaska, California, Colorado, Idaho, Montana, Nevada, Nebraska, New Mexico, Oregon, Washington, and Wyoming. The Mobile Rail Shop is currently assigned two Depot motor vehicles.

No hazardous wastes are generated by this activity at the Depot.

#### 11.7 U.S. Army Reserves

The U.S. Army Reserves have an annual training program at TEAD-N. During the summer months reserve units are trained in two-week intervals. During 1982 the Reserves plan to train 18 units. The number of units to be trained is only about half the number of units in the past.

The reserve units are housed in the troop area in the southeast section of the North Area. They occupy 26 buildings plus maneuver areas. Two areas exist on the installation which are available and have been occasionally used for maneuver training. The first is located between the Ethiopian Dam and the inactive chemical firing range. The second is located immediately to the west of the administration area. Neither area contains permanent facilities; in both, portable support is brought in according to need.

The existing firing range at TEAD is used by the reserves. Use of the range is confined to small arms (up to M-60 machine gun).

No hazardous waste are generated by the Army Reserves at TEAD.

#### 11.8. U.S. Army Toxic and Hazardous Material Agency

One civilian is currently assigned to this activity. The Toxic and Hazardous Material Agency is responsible for advising and assisting on all chemical demilitarization operations at Dugway Proving Grounds and Tooele Army Depot. The Agency also acts as liaison office between the Project Manager's Office and the Commanders of the installations at Dugway and Tooele. Currently one depot pick-up truck is assigned to this area. No hazardous wastes are generated by this activity.

## d. Buildings and Structures

### 1. Introduction

The typical building on the installation was constructed in the early 1940s and consists of a wood frame structure with wood sheathing covered with asbestos-cement shingles and either composition shingles or built-up roofing. A large majority of the buildings are poorly insulated.

Buildings are categorized with a numerical code established by the Department of Defense to identify real property. The category codes are organized into nine facility classes based on the function of the facility as follows:

100	Operational and Training Facilities
200	Maintenance and Production Facilities
300	Research, Development, and Test Facilities
400	Supply Facilities
500	Hospital and Medical Facilities
600	Administration Facilities
700	Housing and Community Facilities
800	Utility and Ground Improvements
900	Real Estate

Buildings at the TEAD installation have been tabulated and described in a report entitled "Tooele Army Depot, Expansion Capability, Tabulation of Existing and Required Facilities," published in May 1979. This report is one of six documents comprising Phase IV of the Master Plan for expansion capability at Tooele. Existing buildings are listed by category and described by size and location. Buildings required for capacity expansion are also identified, with additional space allowances predicated on standard drawing designs contained in AR 415-50 and TB ENG 354. This analysis is used to develop, update, and formulate the master planning process.

Planning for future facilities and site development has been completed through the year 1990. Existing and planned facilities for the Depot are described briefly in the pages that follow. Facilities are shown graphically on the maps on page 17 and 25.

### 2. North Area

#### 2.1. Category 100: Operational and Training Facilities

##### a. Existing

These facilities consist of buildings housing the headquarters, training, shipping and receiving, ammunition handling, gasoline stations, and helipad activities. Operational and training facilities are generally located in the southeast portion of the installation, west of the main gate. Altogether, 15 buildings and approximately 386,619 square feet of building space are provided for operational and training services.

b. Proposed

Master planning for operational and training facilities proposes the construction of an ammunition surveillance workshop. This facility is assigned a 141 40 classification. The workshop will be located west of Igloo Block D and will contain approximately 19,500 square feet.

2.2. Category 200: Maintenance and Production Facilities

a. Existing

These facilities are generally buildings accommodating paint, dunnage, equipment maintenance, repair, handling, inspection, and ammunition. Maintenance and production operations are located north of the main entrance, west of and paralleling the main railroad line. These buildings average approximately 10,000 square feet. The largest is the general-purpose maintenance shop, occupying 432,337 square feet. Other large buildings in this category are the guided missile maintenance and secondary items receiving facilities. Cumulatively, maintenance and production facilities contain approximately 877,776 square feet of building space.

b. Proposed

Construction of an additional 191,132 square feet of buildings is proposed as part of the Master Plan, as shown in Table 4. The majority of this construction will be located near the existing maintenance facilities.

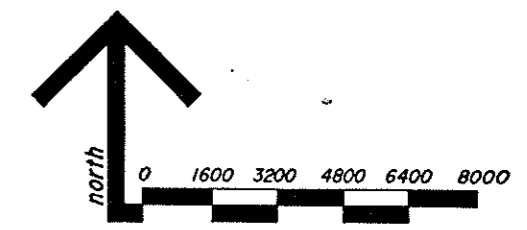
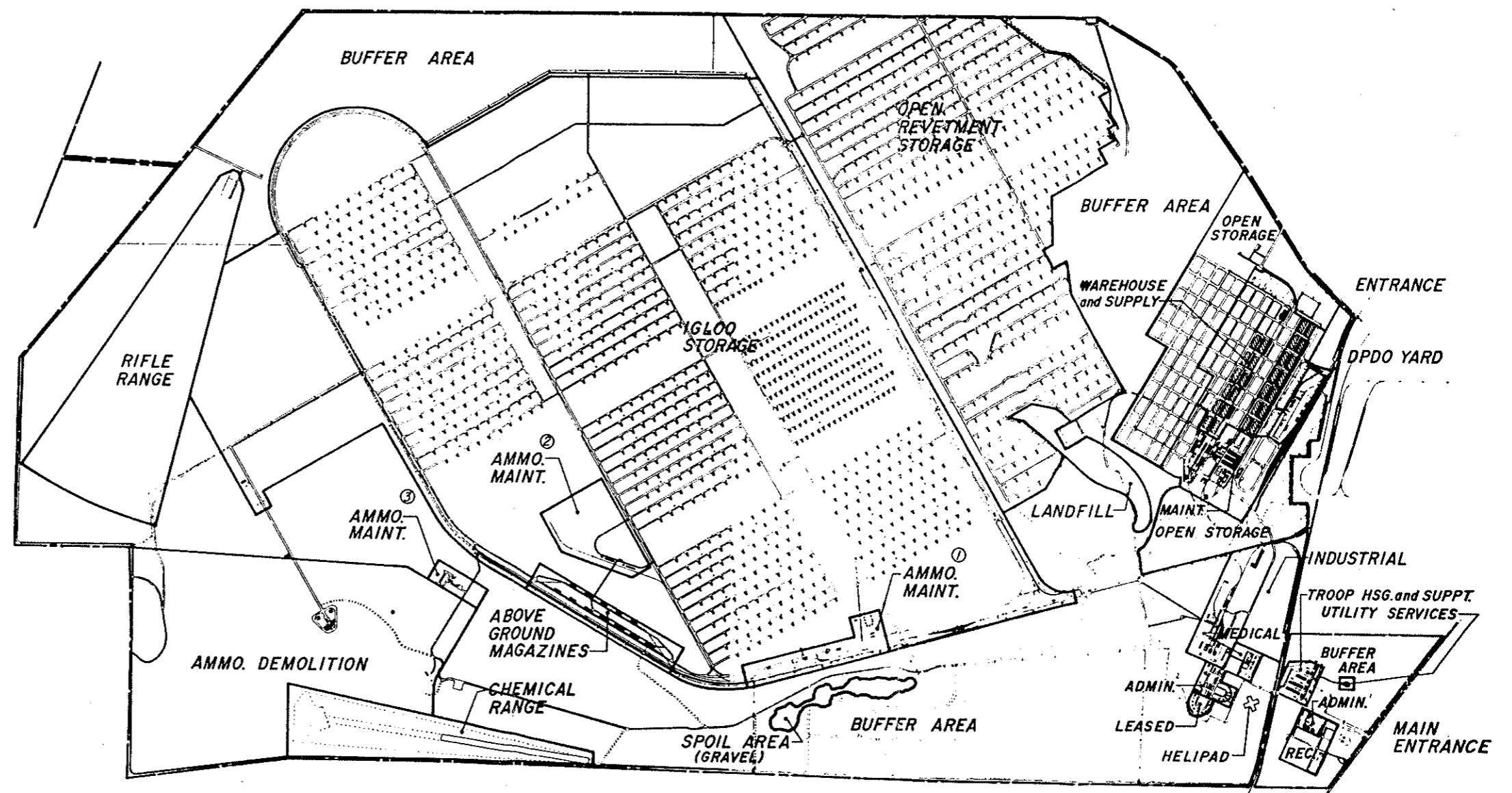
2.3. Category 300: Research, Development, and Testing Facilities

a. Existing

Laboratories, testing, and ordinance facilities make up the majority of this category. Presently, TEAD North has two buildings used for research, development, and testing. An ordinance facility occupies 5,054 square feet and a tracer test facility is located in approximately 60 square feet.

b. Proposed

No new buildings are proposed as part of the Master Plan.



EXISTING LAND USE

TABLE 4  
MAINTENANCE AND PRODUCTION FACILITIES  
PROPOSED IN THE TEAD MASTER PLAN

<u>Construction Category</u>	<u>Project Title</u>	<u>Size in Sq. Ft.</u>	<u>Location</u>
214 90	Engineering equipment diagnostic and storage facility	143,200	First street and C Avenue Maintenance area
218 85	Radiator/fuel tank repair	13,292	Addition to Bldg 615
218 90	Topographic facility (replaces an existing facility)	34,640	7th Street and C Avenue

\*\*\*\*\*

#### 2.4 Category 400: Supply Facilities

##### a. Existing

Included within the supply category are facilities for storage, including open, covered, and enclosed (igloo) structures; warehousing, and magazines. The land and building space required for supply facilities is greater than that required for any other facility category at the Depot. Igloo storage occupies 1,845,576 square feet (42.4 acres); general purpose warehouses contain 1,808,047 square feet (41.5 acres); and 3,652,352 square yards (754.6 acres) are used to provide open storage. Open storage requires minimal land development but basically provides only access and security. No buildings are directly associated with open space storage. Storage and supply facilities are located throughout the installation.

##### b. Proposed

An additional building is planned for defense property disposal. The defense property disposal administration facility (category 442 85) will occupy approximately 4,000 square feet, replacing an existing substandard building. It will be located in the disposal yard.

#### 2.5 Category 500: Hospital and Medical Facilities

##### a. Existing

Existing medical facilities at TEAD consists of a clinic and a dental facility. These services are located in the southeast portion of the installation, northeast of the administration area. Two buildings comprise the facilities: a 3,325 square foot dental clinic, and a 29,100 square foot dispensary (without beds).

b. Proposed

A new clinic is proposed to replace the existing outmoded and inadequate medical clinic. The 9,600 square foot facility will include a pharmacy, out-patient facilities, an ambulance dock, and an equipment room. The facility will be located west of the existing clinic.

2.6 Category 600: Administration Facilities

a. Existing

Six buildings are currently used for administrative purposes, containing facilities for engineering, headquarters data processing, and personnel services. The General Purposes Administration Building is the largest of these facilities, with 186,875 square feet. Administrative facilities at TEAD North are located south of the main entrance road east of the main railroad line.

b. Proposed

Three new buildings are proposed: a command and computer center; a supply company facility; and a supply distribution center facility. The command center will contain 114,345 square feet and be located west of the existing hospital. It will accommodate and consolidate the Commander's Office, the computer center, Directorate offices, and administrative/support operations. The supply company building will be located in the troop housing area. The supply distribution center will be located between K and L avenues between 5th and 7th streets northeast of the maintenance area.

2.7 Category 700: Housing and Community Facilities

a. Existing

Buildings in this category can be classified as permanent housing, temporary housing, recreational facilities, or miscellaneous housing. TEAD offers no on-base housing. A private firm offers and maintains minimal on-base housing located on land leased from TEAD. Temporary housing consists of barracks and mess facilities. A gymnasium, pool, and other amenities comprise the community and recreational facilities. Miscellaneous buildings house a fire station, a laundry, a credit unions, a recently constructed 6,500 square foot 400-man mess, and other similar facilities. The largest buildings in this category are the barracks, occupying 144,314 square feet. The majority of housing and community facilities are located in the administration area of TEAD North.

b. Proposed

No new facilities are proposed.

## 2.8 Category 800: Utilities and Ground Improvements

### a. Existing

The electrical, water, sewer, and railroad systems require buildings to house ancillary facilities. TEAD currently has a battery room, an oil-fire heating plant, a water pumping station, and a compressed air plant. This category also includes standby generators; substations; wastewater collection, treatment, and disposal facilities; water system improvements; roads; and parking facilities. Some of these improvement will be discussed in subsection 2.10 below.

### b. Proposed

A new coal-fired boiler will be constructed at the northwest corner of C Avenue and 6th Street. This facility will have three 1,000 horsepower boilers (one on standby) and will replace an existing oil-fire unit.

## 2.9 Category 900: Real Estate

No buildings are associated with the real estate category.

## 2.10 Major Structures

### a. Domestic Wastewater Treatment Facilities

Most domestic wastewater at TEAD-N is treated by means of stabilization lagoon. This facility services the maintenance and administration areas and is located west of the maintenance area, along Incinerator Road, at the northern terminus of the sanitary landfill. The domestic wastewater is contributed by personnel living off-Depot, during their regular day shift. A negligible portion is contributed by family housing units located on Depot land. Under these circumstances the lagoon experiences intermittent peak flows generally at the beginning of shifts, in mid-morning, and at the end of shifts.

The existing treatment facility consists of two eight-acre cells. Since its constructions, only cell No. 1 has been utilized. Overflow to cell No. 2 has failed to occur. Such facilities are designed using a water balance based on influent flows, precipitation, evaporation, and an allowable seepage rate. Based on design criteria calling for net evaporation (evaporation minus precipitation) of 30 inches per year and an allowable seepage rate of one-half inch per day, the existing wastewater treatment facility's capacity is as shown in Table 5.

TABLE 5  
CAPACITY OF THE WASTEWATER TREATMENT FACILITY AT TEAD-N

<u>Description</u>	<u>Cell No. 1</u>	<u>Cell No. 2</u>	<u>Total</u>
Water surface area	8 acres	8 acres	16 acres
BOD, SS loading <sup>1</sup>	240 ppm	240 ppm	480 ppm
Population equivalent (based on 100 GPCD)	1,264	1,264	2,528
Population equivalent (based on loading 40 lbs. BOD/ac/day and .2 lbs BOD/cap/day)	1,600	1,600	3,200

Note:

<sup>1</sup>BOD = biochemical oxygen demand; SS = suspended solids; units are parts per million.

\*\*\*\*\*

No additional facilities are proposed.

b. Towers

A siren tower, antenna, and two observation towers are located within the operational and training facilities at the installation. These structures are supplementary to Depot operations and of minor significance.

No additional towers are planned as part of the future development at the installation.

c. Water Storage

The total storage capacity in the North Area tanks and reservoirs is 1,975,000 gallons. All tanks and reservoirs are either underground or on ground surface, with no elevated storage tanks. A recent analysis estimated the storage requirement at 1.16 million gallons per day (mgd), based on fire flow requirements and existing demand.<sup>8</sup> The 1.98 mgd available at TEAD North offers the capability of handling a 71% increase. The construction of a proposed new 400,000 gallon storage tank will further increase potential expansion.

d. Septic Tanks/Drainfields

Isolated areas of the North Area utilize septic tank-drainfield installations for the disposal and treatment of domestic sanitary sewage. These include the Ammunition Workshop Area, Ammunition Maintenance Facilities, Furnance Site, Ammunition Demilitarization Facility, Ammunition Classification Yard, and a portion of the Igloo Storage Area.

### e. Storage Tanks

Liquid substances stored at the installation include diesel fuel, gasoline fuel, and non-propellants, in addition to portable water. Diesel fuel and gasoline are used in the maintenance, operation, and testing of combat and staff vehicles. The majority of the storage tanks are for fuel. There are five tanks above ground with a combined capacity of 538,090 gallons, including one tank of 500,000 gallons. Statistics for the underground tanks are summarized in Table 6. Altogether the capacity of the underground tanks is 569,599 gallons, bringing the total storage tank capacity of TEAD-N to 1,107,689 gallons.

### 3. South Area

Most buildings at TEAD-S are located either in the northeast corner of the installation or at CAMDS in the southwest portion of the site, as shown on the map on page 25. In the northeast corner are the administration buildings, shops, and warehouse, a private housing area, and service areas. CAMDS operations occupy the southwest area.

#### 3.1 Category 100: Operational and Training Facilities

##### a. Existing

Operational and training facilities consist of a laundry occupying 5,948 square feet and located in the administrative area.

A change house facility occupies approximately 3,000 square feet and is located in the Chemical Ammunition Exclusion Area.

##### b. Proposed

No other buildings are proposed.

#### 3.2 Category 200: Maintenance and Production Facilities

##### a. Existing

Maintenance facilities at the South Area consist of toxic chemical ammunition maintenance occupying a total of 46,571 square feet; maintenance facilities for miscellaneous procured items and equipment of 24,808 square feet; and installation repair and operations with 46,280 square feet. Altogether maintenance and production occupy 125,659 square feet at the South Area.

##### b. Proposed

The construction of a new chemical and environmental assessment laboratory is planned. The proposed 9,800 square feet laboratory is to be sited in the CAMDS compound. It will replace an existing substandard facility and will improve the overall efficiency of this operation.

TABLE 6  
UNDERGROUND STORAGE TANKS AT TEAD-N

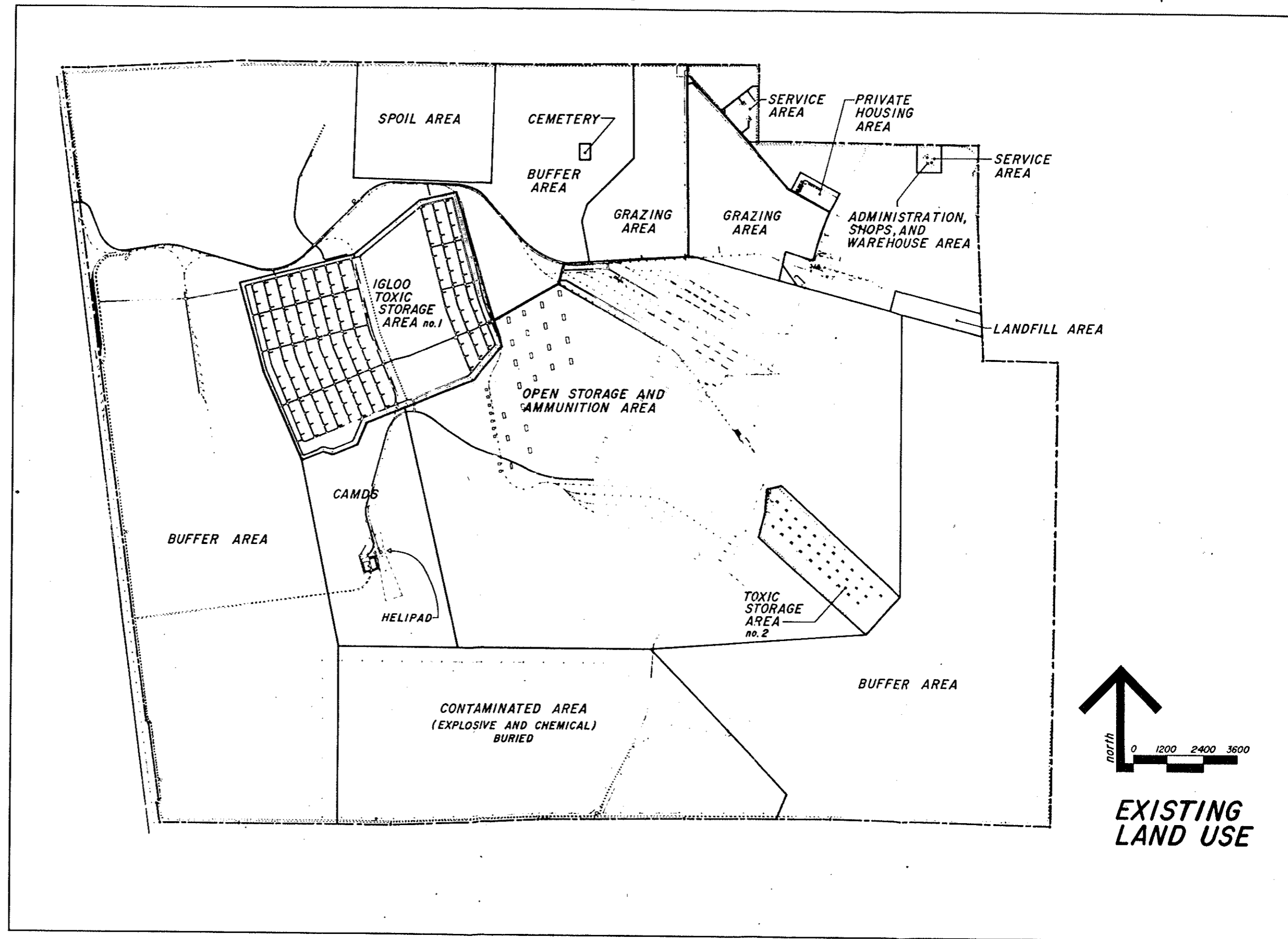
<u>Structure Number</u>	<u>Tank Capacity (gal.)</u>	<u>Use</u>	<u>Structure Number</u>	<u>Tank Capacity (gal.)</u>	<u>Use</u>
1	2,000	F	515 T1	11,790	D
8	3,000	F	515 T2	11,790	D
S-9	1,000	F	S-519	3,000	F
S-10	1,000	F	520	3,000	F
SL-27	3,000	F	594	5,000	F
SL-28	3,000	F	S-595	10,000	F
S-35	3,000	F	S-606	40,000	F
S-37	12,300	F		40,000	F
	16,300	F		40,000	F
S-50	1,000	F		1,000	F
	1,000	F	S-610	19,905	F
53	15,000	F		19,905	F
S-79	1,000	F		19,905	F
S-100 & S-105	5,000	F	S-614	2,000	F
S-101	1,000	F		1,000	F
S-103	1,000	F	S-616	1,000	F
S-104	3,000	F	629 T1	2,000	K
S-110	1,500	F	629 T2	11,343	G
S-111	1,500	F	629 T3	11,343	G
S-112	1,500	F	629 T4	6,000	S
S-113 & S-115	3,000	F	S-637	24,390	F
S-114 & S-116	3,000	F		3,000	D
S-117 & S-119	3,000	F		2,000	G
S-118	2,000	F	S-671	10,000	F
S-120	2,000	F	691	2,000	D
S-121 & S-123	2,000	F		2,000	G
S-122	2,000	F		6,000	P
S-124	2,000	F		15,000	F
S-125	1,500	F	S735	1,000	F
S-126	2,000	F	S753	1,000	F
S-130	3,000	F	1000	1,000	F
S-145	1,500	F		1,000	F
S-147 & S-149	3,000	F	1002	1,000	F
S-151	1,500	F	1005	5,000	F
S-153	4,000	F	1320	6,000	F
418	20,000	F	1343	16,048	F
508	30,000	F	1349	1,000	F
512 T1	11,790	F	1375	6,000	F
512 T2	11,790	F			

Key:

F = fuel oil; D = diesel fuel; G-mogas; P = propane; K - Kerosene; S = solvent.

Source: Higginbotham and Associates, "Emergency Expansion Capability, Tooele Army Depot," Tooele, Utah.

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### 3.3 Category 300: Research, Development, and Testing Facilities

No buildings exist and none are proposed for construction in this category.

### 3.4 Category 400: Supply Facilities

#### a. Existing

Including toxic chemical storage facilities. Ammunition occupies the largest amount of area at the South Area. Generally buildings occupy 435,965 square feet and include Depot, toxic ammunition storage, Igloo storage and installation open storage make up the remainder of storage space with 1,369,869 square feet, of which 157,352 square feet were recently constructed. Two bulk agent storage facilities were recently constructed. Other than buffer zones, ammunition and storage occupy the majority of the area at the South installation.

#### b. Proposed

No new facilities are proposed for supply facilities.

### 3.5 Category 500: Hospital and Medical Facilities

#### a. Existing

A 3,007 square foot dispensary (without beds) is presently located in the administration area.

#### b. Proposed

No new construction is proposed for hospital and medical facilities.

### 3.6. Category 600: Administrative facilities

#### a. Existing

The general-purpose administrative building at the installation occupies 24,236 square feet.

#### b. Proposed

No new construction is currently planned as part of the Master Plan.

### 3.7 Category 700: Housing and Community Facilities

#### a. Existing

Housing and community facilities include personnel support and services, and morale, welfare, and recreational facilities. At TEAD-S this includes a fire station (4,395 square feet) and a lunch room (1,206 square feet). Both facilities are located in the administrative area. On-Depot officer and civilian housing is privately owned and operated at the South installation. Twenty-six units, formerly Wherry housing, are located northwest of the administrative area along Duncan Circle.

b. Proposed

The Master Plan for the South Area does not anticipate the need for future facilities under this category.

3.8 Category 800: Utilities and Ground Improvements

a. Existing

Existing structures include a 660 square foot standby generator plant, a 2,731 square foot coal-fired heating plant, an oil-fired heating plant with 240 square feet, and a water pump station occupying 713 square feet. In addition, the South Area has septic tanks with a combined capacity of 483,000 gallons, an elevated water storage tank holding 20,000 gallons, a ground water storage tank holding 1,000,000 gallons, 105,493 linear feet of water pipeline, 359,611 square yards of paved roads, and 178,585 square yard of untreated roads.

b. Proposed

There are no proposed improvements with respect to buildings. Some modifications and extensions to existing utilities will be necessary to provide service to future building construction.

3.9 Category 900: Real Estate

No buildings are associated with the real estate category.

3.10 Major Structures

a. Domestic Wastewater Treatment Facilities

TEAD South consists of two major areas: the administration area and the CAMDS area. The domestic sanitary sewage from the administrative area is collected by gravity sewers and treated and disposed of by means of an Imhoff tank/evaporation-percolation lagoon system. The system is located approximately 2,000 feet south of the administrative area. The Imhoff tank consists of three 100,000 gallon cells. A utilities analysis assigned the tank a capacity of 3,000 EP (equivalent population, based on 100 gallons per capita per day).<sup>9</sup> Existing demand was estimated at 148 EP, resulting in available expansion of 1,927%. In the fall of 1980 a small evaporation-percolation lagoon was constructed to intercept the outfall from the Imhoff tank. The facility is approximately 250 feet by 250 feet.

b. Water Storage Tanks

The total storage capacity of the three South Area water tanks and reservoirs is 1,020,000 gallons. All storage facilities are underground with the exception of a 200,000 gallon elevated tank which serves the CAMDS complex. The present storage capacity is estimated at a 571 EP.<sup>10</sup> This would allow a 65% increase in population.

### c. Miscellaneous Tanks

The South Area stores a variety of liquids above and below ground, including fuel oil, diesel fuel, and gasoline. There is one tank above ground with a capacity of 12,500 gallons, which is being used for fuel oil. The underground tanks are listed in Table 7. At the present time some of the combined capacity of these tanks is not being used.

TABLE 7  
UNDERGROUND STORAGE TANKS AT TEAD-S

<u>Structure Number</u>	<u>Tanks Capacity (gal.)</u>	<u>Use</u>
S-10	2,000	F
116-1	1,000	NIS
128-1	15,275	G
128-2	15,275	G
146-1	15,275	D
146-2	19,054	NIS
301	1,000	F
519	1,000	F
539	1,000	F
541	1,000	F
553	10,000	F

Key:

F = fuel oil; D = diesel fuel; G = Mogas; NIS = not in service.

Source: Higginbotham and Associates, "Emergency Expansion Capability, Tooele Army Depot," Tooele, Utah.

\*\*\*\*\*

Septic tanks and drainfield systems are required at the South installation in order to provide treatment and disposal of sanitary sewage. Approximately 12 such systems are located throughout the Depot, servicing a lab, CAMDS, and chemical ammunition safeguarding. Sizes range from 1,750 gallons to 22,425 gallons.

### E. Contaminated Areas

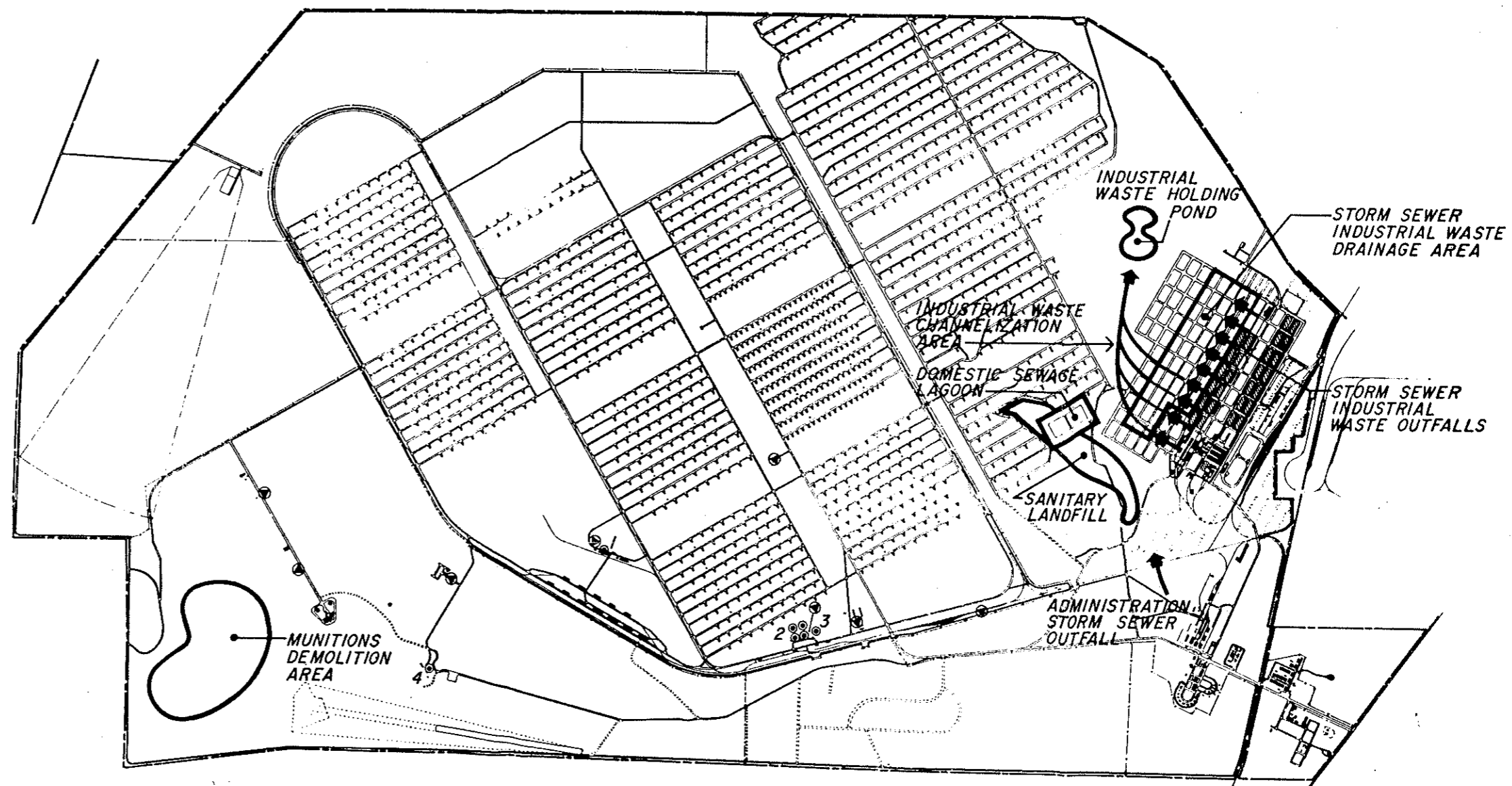
#### 1. North Area

Contaminated areas of TEAD-N are listed in Table 8 and designated on the map on page 31.

The north area sanitary landfill is located west and north of Incinerator Road, at the south end of the open revetment storage area. The site has experienced periodic operational problems in the past including failure to systematically cover waste material. In addition to the disposal of conventional sanitary wastes, the following materials have reportedly been disposed of in the landfill: paint sludge (zing chromate primer used); grease and oil; paper-type oil filters; and heavy metals (plating operations). The landfill accepts approximately seven tons of refuse per day.

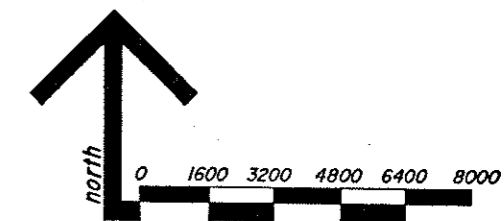
TABLE 8  
CONTAMINATED AREAS AT TEAD-N

<u>Type</u>	<u>Location</u>	<u>Description</u>
1. Several associated ponding areas	Ammunition workshop area, Bldg S-45	Contaminants of unknown composition
2. Cement settling tank with overflow to 4 unlined percolation/evaporation ponds	North of Bldg S-45	Wash-out of munitions containing TNT, composition B, and tritonal (1948-58; 1960-65)
3. Shallow pond	East of 4th pond	Disposal of laundry Bldg 67) and shower waste
4. Shallow pond (covered with grass)	East of Bldg 1303	Wash-down of HE bomb dust
5. Gravel-lined pond	North end of H Road	Industrial waste (late 1940s)
6. Channel outfall area	Northeast of maintenance area (600 series bldgs.)	Chromium, cadmium, (metal finishing operations); detergents, grease oil (steam cleaning); acids and caustics (metal cleaning operations); suspended solids
7. Holding pond	Northeast of maintenance area	Chromium, cadmium, (metal finishing operations); detergents, grease oil (steam cleaning); acids and caustics (metal cleaning operations); suspended solids
8. Storm sewer outfall	Southeast of sanitary landfill	Administrative industrial wastes
9. Sanitary landfill	Northwest of administration area	Hazardous and other wastes
10. Sewage Lagoon	Southeast of block "M" (ammunition storage area)	Sanitary waste water
11. Drainfields	Primary ammunition storage area	Sanitary waste water



### LEGEND

- SEPTIC TANK AND DRAINFIELD
- ⊙ POND (Numbers ; Reference Text)
- ▲ OUTFALL



**CONTAMINATED  
AREAS**

Other sites at TEAD North have been used to dispose of building rubble, garbage, rubber tires, etc. A spoil area is located along the southern boundary of the installation, south of the ammunition maintenance facility. Structurally unsuitable soils and excess excavation soils are disposed of at this site.

Liquid waste contamination at TEAD-N has been the result of industrial activities either directly or indirectly. Directly discharged contaminants include detergents, grease, oil, and heavy metals. Indirect discharge has been the result of wash-down activities associated with contaminated materials. Some types of contamination have occurred in the past and are no longer ongoing.

The potential for industrial hazards exists at the installation's maintenance and repair facilities. Grease, oil, and heavy metals are discharged or washed into the maintenance area storm sewer system before being discharged to open drainage ditches, which are off-limits. These channels are unlined and the high percolation rate of the soils allows absorption of industrial waste into the soil.

The open channels flow north to an industrial holding pond, which is also off-limits. The ditches are subject to periodic re-channelization and also as result have contaminated a large area. The map on page 31 shows the location and flow patterns of the outfall ditches and industrial holding pond.

In 1978 a study estimated that nine buildings located in the maintenance area contributed 67,345 gallons per day of wastewater containing oil, grease, and fuels.<sup>11</sup> Wastewater samples from these outfalls were analyzed in November of 1978. The results of the analysis are summarized in Table 9. The report recommended the installation of 11 oil interceptors and 27,000 lineal feet of ditch cleaning.

TABLE 9  
ANALYSIS OF WASTEWATER FROM THE TEAD-N MAINTENANCE AREA

<u>Standard</u>	<u>D Avenue</u>	<u>E Avenue</u>	<u>L Avenue</u>	<u>C Avenue</u>	<u>B Avenue</u>
Bio-chemical oxygen demand (mg/l)	14.8	807	206	1	390
Suspended solids (mg/l)	20.0	70	56	10	100
Ammonia as NH <sub>3</sub> -N (mg/l)	.01	6.55	.01	.01	19
Total organic carbon (mg/l)	12.0	120	180	4	220
Fecan coliform (MPN/100 ml)	220.0	20	110	790	50

\*\*\*\*\*

A September, 1980 heavy metals analysis<sup>12</sup> indicated toxic levels of lead, cadmium, chromium, and copper in the outfall located at B Avenue. This outfall provides drainage for such activities as welding, metal processing and cleaning, and steam and radiator maintenance. The remaining outfalls, part of the same storm sewer system, also showed the presence of the heavy metals but in concentrations lower than toxic levels.

Storm run-off and industrial wastes from the administration area are also collected by means of a storm sewer system. This system terminates at an outfall located at the southeast corner of the existing landfill. No waste periodically contains contaminants and represents a potential hazard to grazing and drinking livestock.<sup>13</sup>

Wastewater seepage from the sewage lagoon presents a potential threat of contamination to groundwater. The lagoon system consists of two lagoons constructed in 1972 with a combined design capacity of 20,243,212 gallons per day. The lower-level lagoon is connected to the upper-level lagoon by an overflow pipe. The upper lagoon is rarely filled to the point where there is overflow into the lower lagoon. Both lagoons are lined with clay. However, the water level in the upper lagoon is often above the lining which allows for a great deal of seepage through the porous soils.<sup>14</sup>

There is also some potential for contamination of groundwater from the drainfields which serve the ammunition storage area. These drainfields are scattered over a large area and their wastewater flows are relatively low, minimizing their potential impact on ground water.

The North Area demolition and burning grounds are located in the extreme southwest corner of the installation. The following activities have been conducted at this site since 1942: demolition of explosives; burning of explosives and explosive-contaminated materials; disposed of WP-filled munitions (demolition of burning); and burning of riot-control agents and munitions.

Explosive demolitions are conducted against a ridge several hundred feet high. Pits are excavated 12 to 15 meters deep. Up to 6,804 kilograms of materials to be destroyed are then covered with earth and detonated. After detonation, the area is searched for unexploded ordnance; if any is found, it is destroyed in place. All types of conventional ammunitions are destroyed here, from small arms up to 12,000 pound bombs.

On the east side of the ridge, against which the demolition pits are dug, is the WP demolition area. The WP munitions are placed in rows on the ground. A charge is placed on each munition and then detonated. The WP is allowed to burn out.

A variety of materials are burned in pits at TEAD-N, including bulk explosives, explosive-filled munitions, explosive-contaminated materials, smoke pots and grenades, bulk WP, and CS riot control agent munitions, as well as dunnage, packing materials, and containers.

All metals recovered from these demolition and burning operations are returned to ensure the removal of residual contamination. When certified clean, the metals are sent to the Defense Property Disposal Office for salvage.

Meteorological conditions are monitored regularly at TEAD-N. Any condition that could create an environmental hazard to the surrounding area or its inhabitants is cause for cancellation of a demolition or burning operation until more favorable meteorological conditions exist.

The Master Plan for Tooele Army Depot includes the proposed construction of a solid waste incinerator. When completed, the incinerator will reduce the weight of refuse by 70% to 80% and the total volume of solid wastes by as much as 90%. Refuse from the South Area will be transported to the planned solid waste incinerator at TEAD-N. All residue and ash will be received by the existing sanitary landfill in the North Area but the total volume will be reduced by 70% to 90%.

## 2. South Area

Contaminated areas at TEAD-S are listed in Table 10 and designated on the map on page 37.

The present landfill at the South Area was opened in 1976. Prior to this, several sanitary landfills were operated along the south boundary of the present shops and warehouse area, west of the present landfill. Approximately one ton of solid waste per day is deposited at the present landfill.

A spoil area located along the northern boundary of the South Area is used for the disposal of excess and unsuitable excavated soil material.

An unlined drainage pond, located east of Building 600 in the South Area, received wash-down waste from HE cluster bombs during the late 1940s and early 1950s.

Sewage disposal is a possible source of contamination. The South Area contaminated area is served by a gravity-flow collection system, terminating in an Imhoff tank having three 100,000 gallon capacity chambers. The tank is equipped with a pump for cleanout and removed sludge is buried at the landfill. In 1980 a 250 foot by 250 foot lagoon was added to the system to catch effluent leaving the tank. Most wastewater entering the lagoon seeps into the ground with a resulting potential for groundwater contamination.

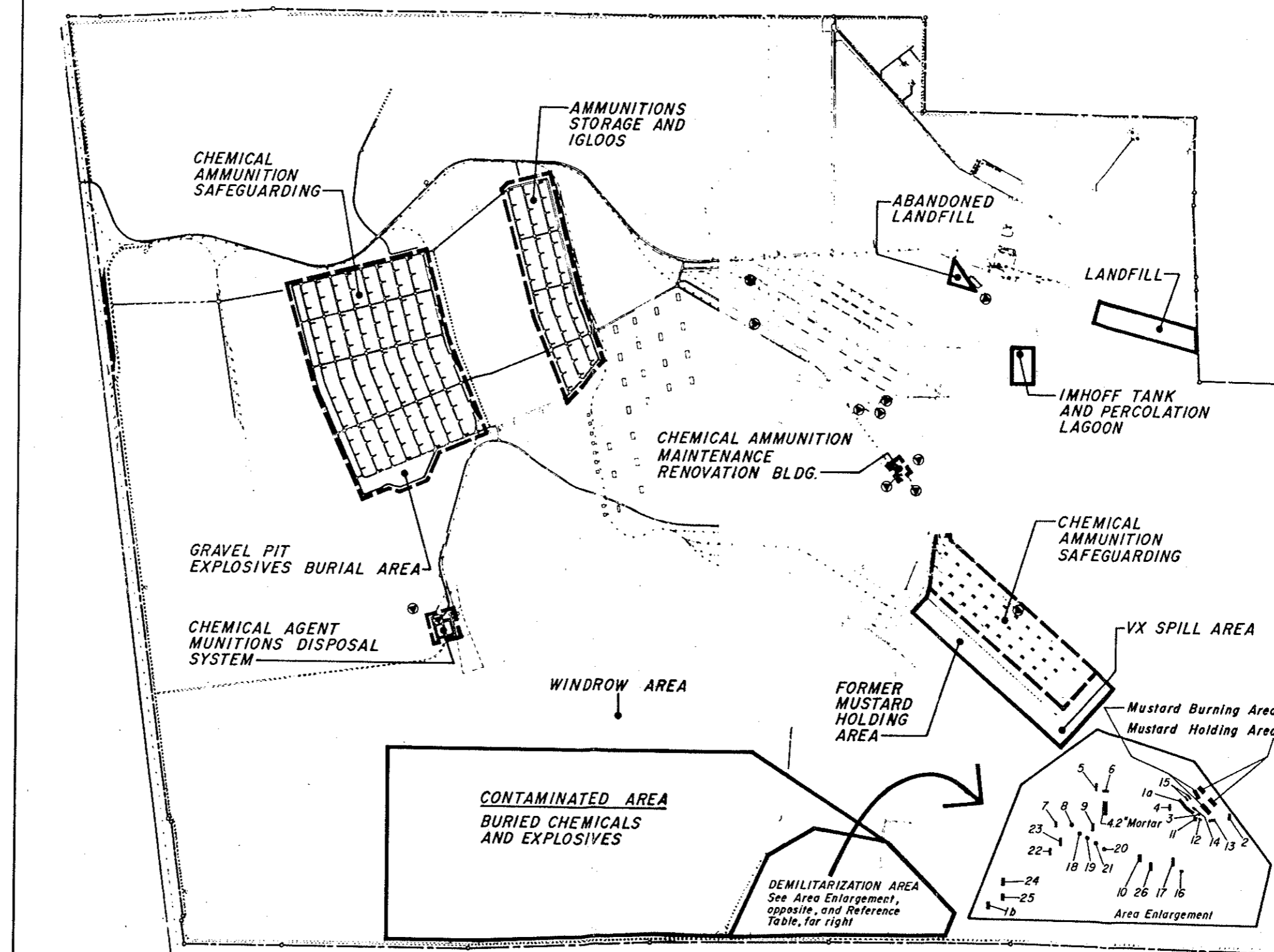
Septic tanks with drainfields are utilized for sewage disposal elsewhere in the South Area. Drainfields are widely scattered and flows are relatively small, resulting in minimal potential for groundwater contamination.

Explosive and chemical materials have been destroyed and buried at the site located along the southern boundary of the South Area. Little data is available concerning the western three-quarters of the site. The remaining "demolition site" has been used for the disposal of various types of chemical agents and munitions since the mid-1940s. Disposal was accomplished either by burning or (in the case of CK- and CG-filled items) by being released into the atmosphere. Materials to be destroyed by burning were transported to the burn site within the demolition area and placed on piles of dunnage; the pile was then ignited. The heat ruptured the items and exposed the fill to the flames for thermal decomposition. After cooling, the scrap was taken to a pit and buried. In the late 1950s, items containing CK and CG were taken to the demolition area where the filling plugs were removed and the agent allowed to dissipate into the atmosphere. When empty, the containers were burned, put into a pit, and buried.

TABLE 10  
CONTAMINATED AREAS AT TEAD-S

<u>Type</u>	<u>Location</u>	<u>Description</u>
1. Sanitary landfill	East of admini- stration area	Hazardous and other wastes
2. Abandoned sanitary landfill	West of sanitary landfill	Hazardous and other wastes
3. Spoil area	Along northern boundary of TEAD-S	Excess and unsuitable excavated soil material
4. Imhoff tank and sewage lagoon	Southwest of sani- tary landill	Sewage
5. 12 septic tanks and drainfields	Scattered in vari- ous locations	Sewage
6. Drainage pond (unlined)	East of Bldg 600	Wash-down wastes from HE cluster bombs (1940s and 1950s)
7. Demolition and burn- ing ground areas	Along southern boundary of TEAD-S	Chemical agents, muni- tions, and other hazardous materials
8. 2 mustard-holding areas	Demilitarization area	Mustard
9. 2 mustard-holding areas	Demilitarization area	Mustard burning, possible burning of H
10. 4.2" mortar pit	Demilitarization area	Projectiles
11. Covered pits	Demilitarization are	
#1a		M70 mustard bombs
#1b	Mustard bombs, M4A2 smoke pots, white phosphorus grenades, trash	
#2		Thermite
#3		Smoke pots
#4		M20 bomb clusters
#5		Smoke pots
#6		Smoke pots
#7		Smoke pots
#8		Smoke pots
#9		M50XA3 bombs
#10		Smoke pots
#11		Thermite
#12		Smoke pots
#13		Smoke pots
#14	M70 mustard bombs, one German Tabun gas bomb	
#15		M70 mustard bombs
#16		M70 mustard bombs
#17		M70 mustard bombs
#18		M50XA3 bombs
#19		M50XA3 bombs
#20		M50XA3 bombs
#21		M50XA3 bombs
#22		M50XA3 bombs
#23		M70 mustard and M47 bombs
#24		M70 mustard bombs
#25		Trash pit
#26		Boosters
		Poison gas (probably mustard)

\*\*\*\*\*



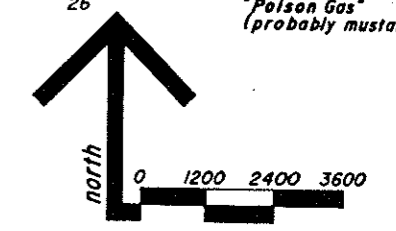
### LEGEND

● SEPTIC TANK AND DRAINFIELD

### REFERENCE TABLE

Contents Of Covered Pits Within The Demilitarization Area

PIT NUMBER	CONTENTS
25	Boosters
1a, 14, 15, 16, 23	M70 Mustard Bombs
1b	Mustard Bombs, M4A2 Smoke Pots, White Phosphorus grenades, trash
2, 10	Thermite
3, 5, 6, 7, 9, 11, 12	Smoke Pots
4	M20 Bomb Clusters
8, 17 thru 21	M50XA3 Bombs
13	M70 Mustard Bombs, one German Tabun Gas Bomb
22	M70 Mustard and M47 Bombs
24	Trash Pit
26	"Poison Gas" (probably mustard)



## CONTAMINATED AREAS

In 1978 the last of the stored agent AC was incinerated and the containers decontaminated by rinsing with caustic solution. The demolition area contains 27 documented covered pits, surrounded by a fence, where the following were buried: M70 mustard bombs, M4A2 smoke pots, WP grenades, trash, thermite, M20 bomb clusters, M50XA3 bombs (thermate), one German Tabun bomb, M47 mustard bombs, boosters, and poison gas (probably mustard). It is also said that mustard was disposed of in this general area without burning.<sup>15</sup>

The demilitarization area also contains two mustard-holding areas where leakers were stored prior to destruction and two nearby pits where H is thought to have been burned. In addition, there is a covered pit, known as the "gravel pit," just south of storage area 10 that is said to contain M2 ignition cartridges, squids, hand grenades, blasting caps, and M21 incendiary bomb clusters. This pit area might also contain smoke pots, TNT blocks, M74 incendiary bombs, FS smoke (in bottles), and M19 incendiary bombs. The contents of this pit were not demilitarized prior to burial.<sup>16</sup> Chemical agent identification kits are said to have been buried in the South Area demolition grounds in 1949 or 1950.

Another pit contains cans and 208 liter drums. Several cans are marked "Decontaminating Agent, Non-corrosive:" however, no markings were visible on the majority of cans and drums in this pit. This pit is not fenced or marked with warning signs.

The 4.2-inch mortar pit in the demilitarization area contains approximately 59,000 projectiles. These projectiles were burned in an open pit sometime prior to 1954 in 15 other pits in the demolition area. These pits were formerly designated 31 through 45 but are no longer identified. The 4.2-inch projectiles were transferred to their current location about 1971. Some are possibly contaminated with H.<sup>17</sup> The original pits were reportedly treated with hypochlorite-based decontamination powder. The contents and location of former pits 27 through 30 are unknown.

The Master Plan for Tooele Army Depot includes proposed construction of a solid waste incinerator in the North Area. Most solid waste from the South Area will be transported there for incineration after it is constructed. This will greatly reduce the use of the South Area's sanitary landfill.

## II. ENVIRONMENTAL SETTING

### A. The Physical Environment

#### 1. Geology and Mineral Resources

##### 1.1 North Area

Tooele Valley is a sedimentary basin lying between two fault-block mountain ranges: the Oquirrh Mountains to the east and the Stansbury Mountains to the west. (See the map on the following page.) The entire valley was once inundated by ancient Lake Bonneville.

The valley consists of moderately consolidated and unconsolidated layers of sand, gravel, silt, and clay. The underlying bedrock has been submitted to various geologic stresses which have created a series of troughs and ridges; therefore, the thickness of the overburden varies considerably.<sup>18</sup> Bedrock approaches the surface at several locations but has not been encountered in other areas by drilling operations ranging from depths of 290 to 7,100 feet.<sup>19</sup>

Tooele Valley contains a wide variety of mineral resources. Mining has been a continuous activity in the valley for many years, especially in the Oquirrh Mountains. The major minerals currently being extracted in the area include copper, dolomite, gold, gravel, lead, limestone, mercury, salt, sand, silver, and zinc.<sup>20</sup>

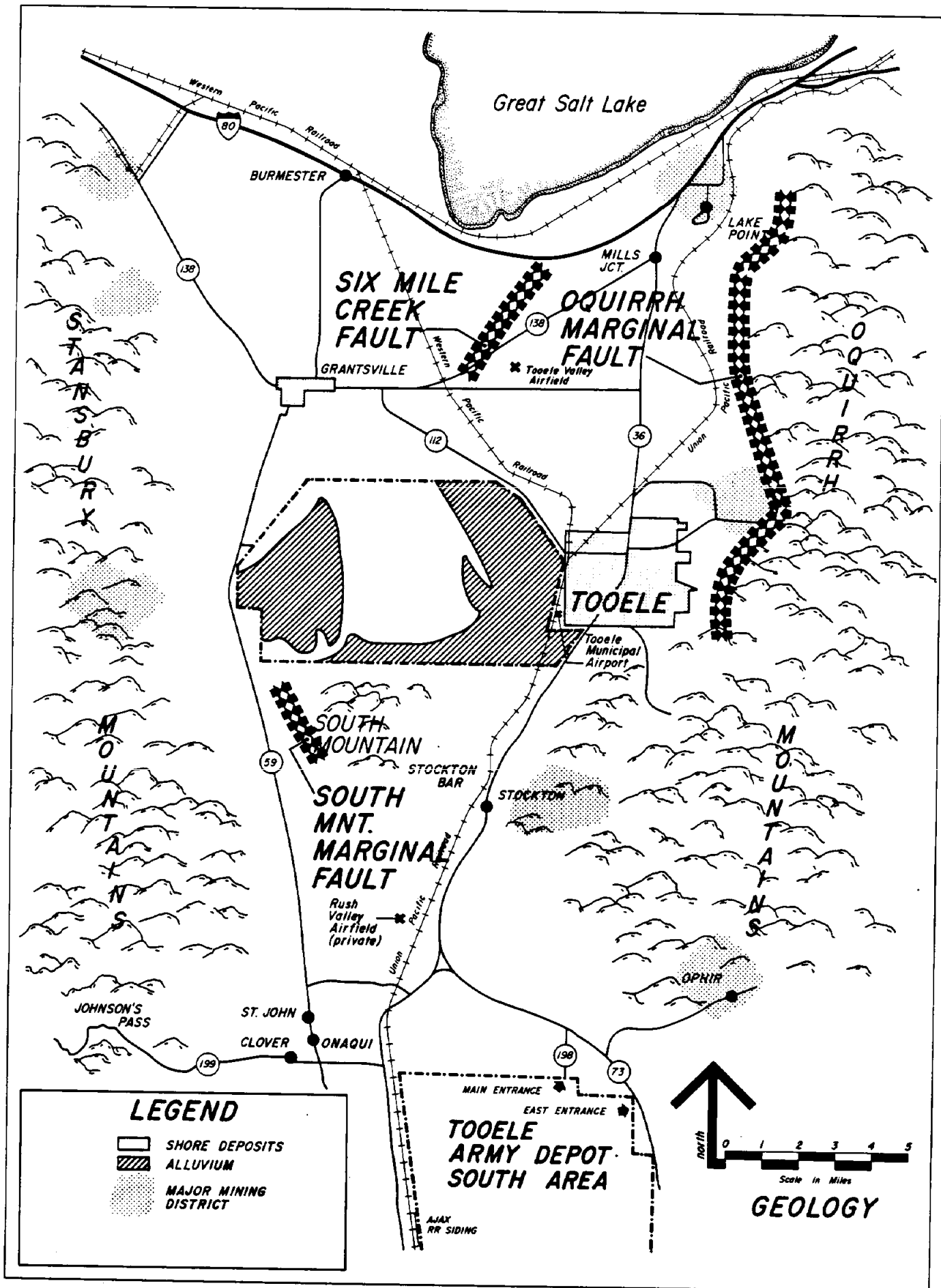
Two potentially active fault zones occur in Tooele Valley and a third extends into Tooele Valley from Rush Valley. No major earthquakes have been recorded in Tooele Valley since its settlement. The nearest have occurred in the western slopes of the Stansbury Mountains (1915) and at Magna (1962). Numerous "micro-earthquakes" of low magnitude have been recorded in the valley, clustering generally around either Flux or the southwestern portion of TEAD-N. These events have probably reflected blasting in limestone quarries or munitions disposal operations.<sup>21</sup>

Although recent seismic activity has been light and there has been no reported surface movement caused by earthquakes, the area may be considered as potentially active due to lack of evidence to the contrary. It may also be assumed that many potentially active faults remain undetected.<sup>22</sup>

##### 1.2 South Area

Rush Valley is also a sedimentary basin lying between fault-block mountain ranges, and large portions of this valley also consist of moderately consolidated and unconsolidated layers of sand, gravel, silt, and clay. A significant portion of the valley does, however, consist of poorly drained, unvegetated plains of silt or clay, and other areas contain pediments cut on rock lying near the surface. Portions of the valley were once covered by ancient Lake Bonneville.<sup>23</sup>

The underlying bedrock in Rush Valley has been deformed by geological stress. Although data is limited, the thickness of the overburden appears to vary considerably. One well reached a depth of 1,004 feet without encountering bedrock; others have encountered bedrock at depths ranging from 340 to 540 feet.<sup>24</sup>



A wide variety of mineral resources are found in Rush Valley, especially in the Oquirrh and Tintic Mountains. Two mines, in conjunction with other mines in Tooele County, provide 50% of the nation's beryllium ore. Major minerals currently being extracted from Rush Valley include copper, fire, clay, gold, gravel, limestone, lead, mercury, sand, silver, and zinc.<sup>25</sup>

No major earthquakes have been recorded in Rush Valley since its settlement and the valley lies at least 20 miles from the nearest recorded earthquakes in the Stansbury Mountains at at Magna. In fact, very few "micro-earthquakers" have been recorded. The valley does, however, contain a number of potentially active faults, as shown on the map on the following page. This are may be considered as potentially active due to a lack of evidence to the contrary.<sup>26</sup>

## 2. Soils

### 2.1 North Area

Soils in Tooele Valley are of the major soil group Pedocal, consisting of soils which occur where rainfall in less than 25 inches annually and which contain an excess of calcium carbonate (limestone). Calcification occurs where evaporation normally exceeds precipitation and rainfall is insufficient to leach the soils. Lime and other bases are then restored to either the surface or subsoils by vegetative and capillary actions, which is a common occurrence in the grasslands of steppes and semi-deserts.

### 2.2 South Area

The soils in Rush Valley are similar to those in Tooele Valley, although they contain more silt and clay and less organic material.

## 3. Topography and Drainage

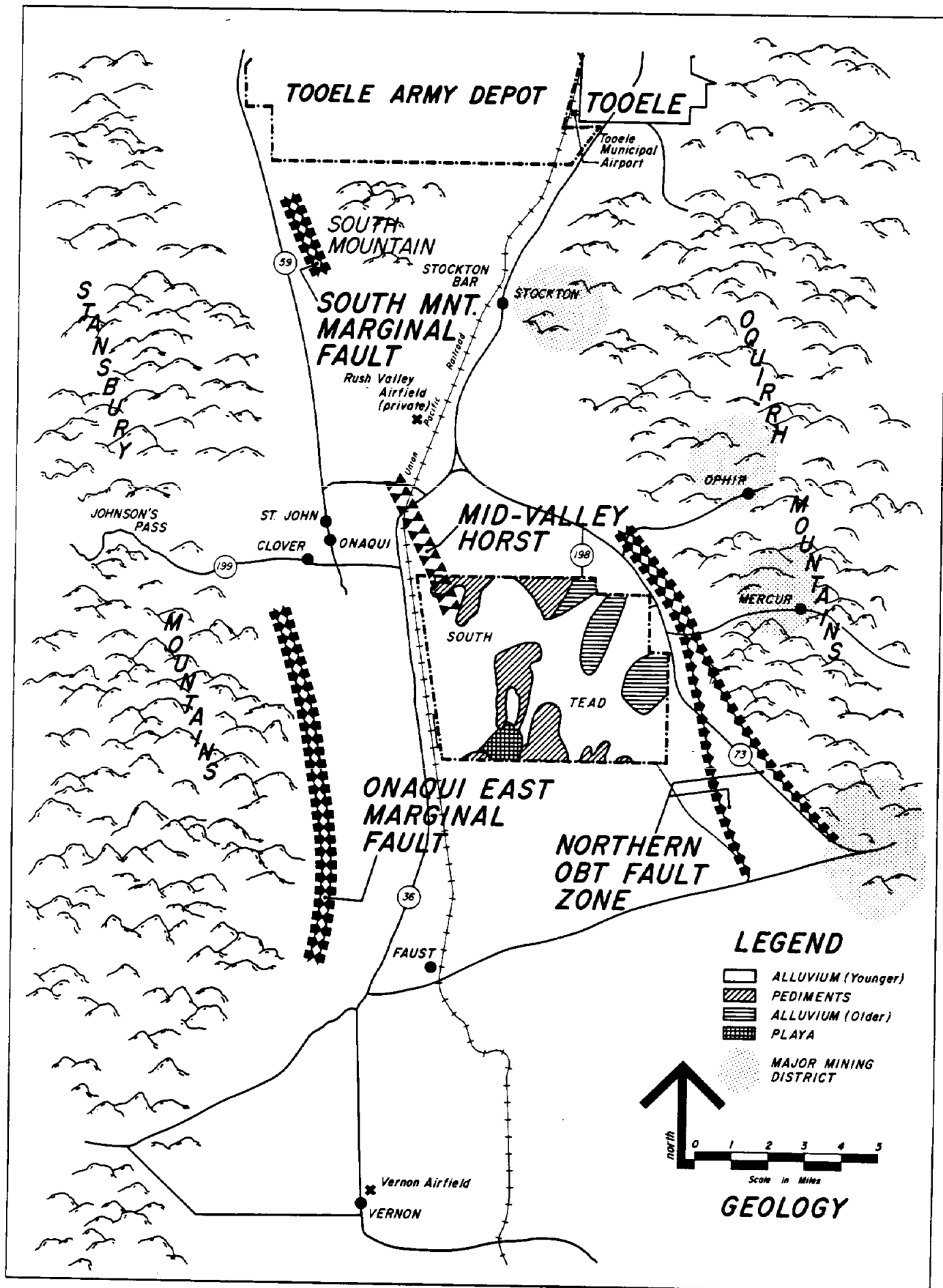
### 3.1 North Area

Tooele Valley contains three topographic zones:

- (a) steep to abrupt slopes in the mountainous areas which form the eastern and western boundaries;
- (b) moderate to steep slopes in the transition zone between the mountains and the valley floor; and
- (c) gentle to moderate slopes on the valley floor.

Elevations range from 11,031 feet at Desert Peak, located in the Stansbury Mountains near the southwestern portion of the valley, to 4,200 feet near the shores of the Great Salt Lake. Elevations on the valley floor average 4,700 feet.

Surface drainage is generally downward from the mountains to the valley floor, and then northerly toward the Great Salt Lake.



### 3.2 South Area

Rush Valley contains the same three topographic zones as Tooele Valley, with slopes ranging from steep in the mountains to gentle on the valley floor. The highest point is Lowe Peak (10,590 feet) in the Oquirrh Mountains the northeast portion of the valley. The lowest point is Rush Lake (4,960 feet) in the northern central portion of the valley. Elevations on the valley floor average 5,080 feet.

Surface drainage is generally downward from the mountains to the valley floor, and then northerly toward Rush Lake. The area around Vernon, however, forms an oval sub-basin, and drainage is nearly centripetal towards Vernon and Government creeks, then into Faust Creek, which flows northward.

## 4. Climate

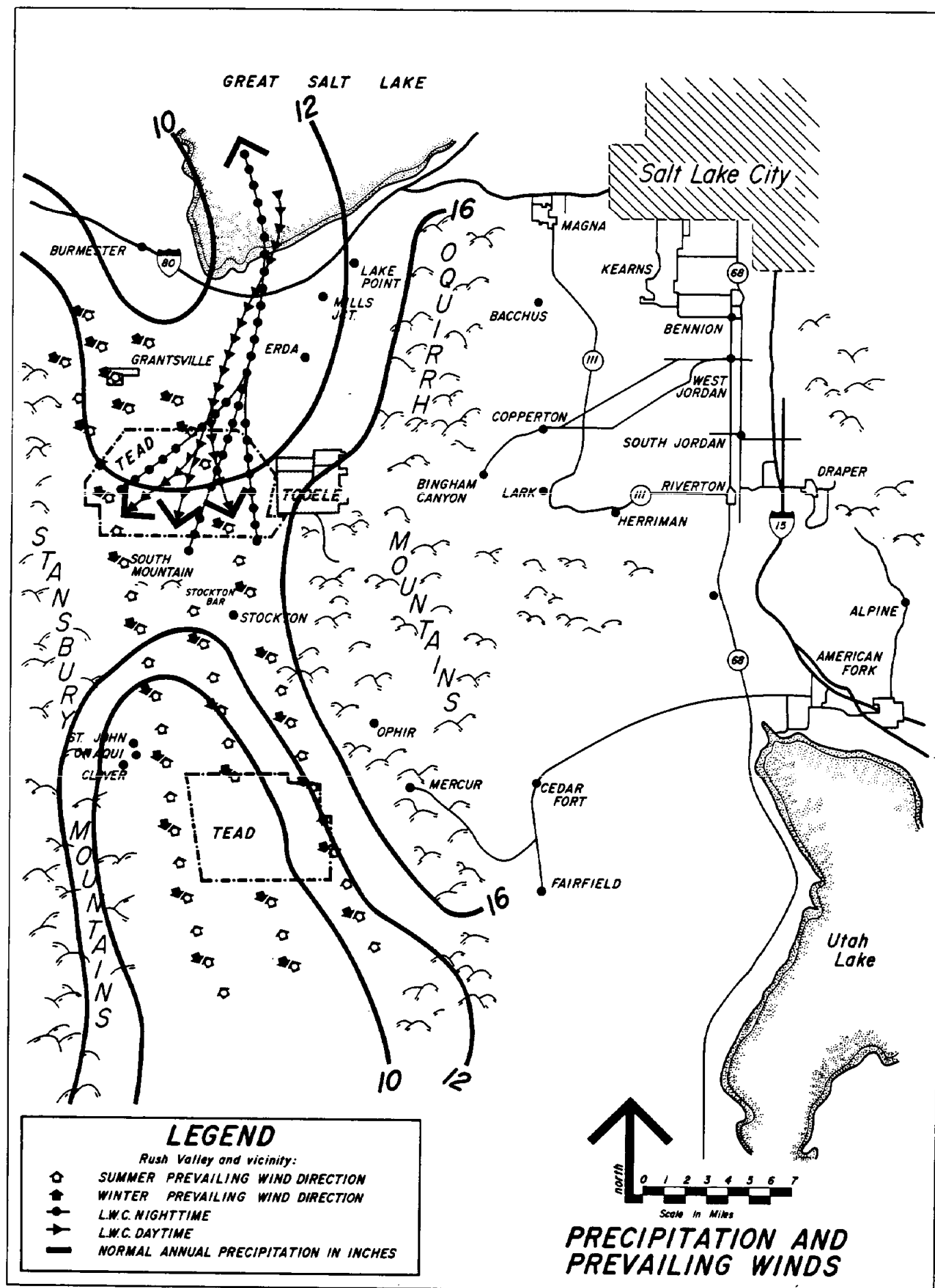
### 4.1 North Area

Tooele Valley is characterized by hot, dry summers, cool springs and falls, moderately cold winters, and a general year-round lack of precipitation. The higher elevations of the adjacent mountains experience greater amounts of precipitation and somewhat cooler temperatures.

Most precipitation occurs as snow between early fall and late spring, when the valley is affected by the continental winter storm track. Summers are generally dry, but showers and thunderstorms occur occasionally. The largest amount of precipitation occurs in the mountains, creating a potential for flash floods and erosion. Grantsville, approximately two miles northwest of TEAD-N, receives an average annual precipitation of 11.0 inches; Tooele receives an average of 16.5 inches.<sup>27</sup> The map on the following page shows precipitation and prevailing winds for the area containing both TEAD-N and TEAD-S.

Low humidity is a characteristic of the valley climate and visibility is generally good. During winter months, however, storm fronts are usually followed by high pressure fronts occasionally lasting for several weeks. These fronts trap the cold air in the valley, creating temperature inversions which can create significant fog and smog problems.<sup>28</sup>

The Salt Lake Basin forms a large, generally enclosed air basin of 7,500 square miles. The Great Salt Lake is a shallow body of water covering approximately 2,000 square miles, which is large enough to drive a classical sea-breeze circulation. The sea-breeze circulation moving through the air basin is called the local wind circulation (LWC). The LWC is caused by the uneven heating and cooling of the land and water surface. This diurnal wind tends to blow downslope towards the lake at night, when the lake is warmer than the land. During the daytime, when the land is warmer than the lake, the winds flow upslope into the valleys and mountains. This tends to cause a mixing of air in the center of the lake along a north/south axis during the day. The LWC is the predominant wind factor in the basin and winds rarely exceed 10 miles per hour, although passing storms cause higher wind velocities. the LWC produces a constant interchange of air in the basin, but only limited exchange with air external to the basin.



The average annual temperature ranges from a high of 80° F. to a low of 30° F. The highest recorded temperature during the period of 1965-1975 was 110° F., while the lowest for the same period was -14° F. The average spring and fall frost dates are April 1 and October 25, respectively.

#### 4.2 South Area

Separated by only the Stockton Bar and South Mountain, the climates of Rush and Tooele Valleys are quite similar. Rush Valley has between 10 and 12 inches of precipitation annually. The average annual temperature ranges from 75° F. to 28° F., with a 10-year high of 104° F. and a low of -14° F.<sup>29</sup> Nocturnal temperature inversions, caused by extensive nighttime cooling, occur frequently in Rush Valley. The valley floor is the average three degrees cooler than the foothills because of this. The LWC is only a factor at higher elevations, contributing to the lack of air mixing and temperature differential.<sup>30</sup>

### 5. Air Quality

#### 5.1 Air Quality Standards

##### a. Federal Ambient Air Quality Standards

The U.S. Environmental Protection Agency has established standards for a number of air pollutants, as shown in Table 11. Primary standards are designed to protect the public health by providing an adequate safety margin in pollution levels. Secondary levels are established to provide for the public welfare, which is a broad concept covering the effects of soil, water, vegetation, animals, weather, visibility, and personal comfort and well being.

TABLE 11  
FEDERAL AMBIENT AIR QUALITY STANDARDS

<u>Pollutant</u>	<u>Measurement Period</u>	<u>Primary<sup>a,b</sup></u>	<u>Secondary</u>
Particulates	Annual <sup>c</sup>	75 ug/m <sup>3</sup>	60 ug/m <sup>3</sup>
	24-hour <sup>d</sup>	260 ug/M <sup>3</sup>	150 ug/m <sup>3</sup>
Sulfur Oxides	Annual	.03 ppm	.02 ppm
	24-hour <sup>e</sup>	.14 ppm	.10 ppm
Carbon Monoxide	8-hour <sup>e,f</sup>	9 ppm	9 ppm
	1-hour <sup>f</sup>	35 ppm	35 ppm
Photochemical Oxidants	1-hour <sup>e</sup>	.12 ppm	.12 ppm
Hydrocarbons	3 hour <sup>e</sup>	.24 ppm	.24 ppm
Nitrogen Oxides	Annual <sup>d</sup>	.05 ppm	.05 ppm

#### Notes:

<sup>a</sup>Ug.N<sup>3</sup> designates micrograms of pollutant per/cub meter of air.

<sup>b</sup>Ppm designates parts of pollutant (gas) per million parts of air.

<sup>c</sup>Geometric mean.

<sup>d</sup>Arithmetic mean.

<sup>e</sup>Value not to be exceeded more than once per year.

<sup>f</sup>Runnage average.

\*\*\*\*\*

In 1974, as a part of its Prevention of Significant Deterioration (PSD) Program, EPA established three air quality classifications for areas where ambient air quality standards are being met, based on the incremental increase permitted in ambient concentration of particulate matters and SO<sub>2</sub>. These classifications are defined in Table 12.

TABLE 12  
EPA PREVENTION OF SIGNIFICANT DETERIORATION CLASSIFICATIONS

<u>Classification</u>	<u>Designation</u>
I	Regions where almost any air quality deterioration would be significant.
II	Deterioration would not be considered significant from moderate, well-planned growth.
III	Regions where intensive major industrial growth is desired.

\*\*\*\*\*

b. State of Utah Standards

The State of Utah has adopted additional air quality standards in its Code of Air Conservation Regulations. Of particular importance are the sections of the Code dealing with emission limitations and opacity standards:

3.2.1 Emission Limitations. Emission limitations for existing sources, located in or affecting actual areas of non-attainment (of primary federal standards) are hereby established by the Committee and require at a minimum the use of reasonable available control measures to the extent necessary to attain and maintain the NAAQS. Specific limitations for installations within a source listed below which are not specified will be set by order of the Committee. Specific limitations for installations within a source listed below may be adjusted by order of the Committee provided the adjustment does not adversely affect achieving the applicable NAAQS.

4.1.1 In actual areas of non-attainment for particulates, visible emissions from existing installations, excepting gasoline powered internal combustion engines, shall be of a shade or density no darker than 20 percent opacity. Existing installations in other areas of the State which have no other assigned emissions limitation under the SIP, except incinerators and internal combustion engines, shall be of a shade or density no darker than 40 percent opacity except as provided in these Regulations.

4.1.2 Visible emissions from any incinerator or new installation, except internal combustion engines, shall be of a shade or density no darker than 20 percent opacity, except as otherwise provided in these Regulations.<sup>31</sup>

In addition, a precedent-setting portion of Utah State law has placed a temporary maximum on the total allowable emission of sulfur into the atmosphere for any given industrial plant. This was done to clean up Wasatch Front and comply with federal mandates.

State of Utah regulations contain a number of permit requirements to control pollutant emissions. Among the most important are the requirements to:

- (1) verify with the State of Utah that the clearing index is satisfactory in the event of open burning;
- (2) notify the state of the intent to construct new facilities;
- (3) maintain visible emissions at or below No. 2 on the Ringleman Scale, and below No. 1 for newly constructed point sources;
- (4) utilize the best available technology for newly constructed point sources; and
- (5) prevent significant deterioration of air quality.

Open burning may be granted a state exemption through provisions which allow open burning in remote areas of highly explosive or other hazardous materials for which there is no other known practical method of disposal, under the conditions that:

- (1) the burning is limited to material which cannot be safely stored long enough to await favorable meteorological conditions (as defined by the clearing index system);
- (2) there is no open burning of wastes containing Beryllium or other highly toxic material;
- (3) records of time, date, place, and quality of materials must be kept; and
- (4) there is periodic reporting on efforts to eliminate open burning.

## 5.2 North Area

The classical sea-breeze air circulation generated by the Great Salt Lake plays an important role in the air quality and dispersion of pollutants in the Tooele Valley. As noted in the previous section, differential land mass and water temperatures cause downslope air flow during evening hours and upslope flow during late morning and early afternoon hours. A transition period of negligible winds occurs twice daily (late morning and early afternoon) between air flow direction changes.

The upslope flow is strongest during spring and summer months, with increased solar heating, and dispersion of pollutants is good. Fall and winter upslope flows are short and weak and dispersion is dependent on large-scale mechanisms (storms).

Downslope flow appears to be of equal strength in all seasons, but of greater length during the fall and winter compared with the spring and summer months. Also associated with the nighttime downslope flow is the occurrence of nocturnal radiation inversions. These result from the atmosphere near the surface cooling at a faster rate than away from the surface. Inversion layer wind speeds are low; consequently, pollutants emitted in this layer tend to remain there, transported only short distances. Dispersion of these pollutants is dependent upon the long upslope flow during the spring or summer and large-scale mechanisms during the fall and winter.

According to wind flow directions described in the "Great Salt Lake Air Basin Wind Study"<sup>32</sup>, downslope flows may concentrate pollutants within the area of the Great Salt Lake. This concentration can then be dispersed during the upslope flow with the result that any airborne particle may be spread anywhere in the basin. Consequently, although an area may contribute a negligible quantity of air pollutants, the upslope flow may disperse a substantial pollutant load of the ambient air quality to that area. Air pollution from Salt Lake City and environs frequently enters Tooele Valley.

Salt Lake County and a small portion of eastern Tooele County (above 5,600 feet elevation) are considered a non-attainment area (the primary federal standard has not been met) for sulfur dioxide (SO<sub>2</sub>). The Ogden, Salt Lake, Provo, and Bountiful areas are considered non-attainment areas for particulates and carbon monoxide (CO). Davis and Salt Lake counties are non-attainment areas for ozone. The Wasatch Front is an attainment area (secondary standards have been achieved) for nitrogen dioxide and hydrocarbons. Most of Tooele County is an attainment area for SO<sub>2</sub>, CO, particulates, and ozones, and has been designated a Class II area under the EPA PSD Program. This means that ambient air standards would not be exceeded with moderate, well-planned growth.

Air quality in the vicinity of TEAD-N is monitored by EPA, the U.S. Army Environmental Health Agency, and the State of Utah. In cooperation with Tooele County, the State of Utah maintains a continuous monitoring site at Tooele. Wind speed and direction, SO<sub>2</sub>, and particulates are presently monitored. Future plans call for equipment to monitor NO<sub>2</sub> and CO.

Kennecott Copper Corporation operates two air monitoring sites in the area: one in Pope Canyon and one at the eastern base of Johnson's Pass. SO<sub>2</sub> concentrations are monitored on a monthly basis.

In 1974 a total emissions inventory was compiled for Salt Lake and Tooele Counties.<sup>33</sup> Table 13 summarizes the tons per year of pollutants dispersed by each category.

There are no nearby operations causing odor problems in the vicinity of Tooele Army Depot. Occasional odor problems are encountered with general air pollution at National Lead's magnesium plant, U.S. Steel's Geneva Steel Plant, the Kennecott Copper Plant, and in the Salt Lake Valley. The prevailing winds in Tooele Valley travel south to southeast at an average of 8.7 miles per hour. The winds tend to disperse odors and carry them away from work areas and population centers.

TABLE 13  
TOTAL EMISSIONS INVENTORY BY SOURCE CATEGORIES  
FOR SALT LAKE AND TOOELE COUNTIES  
1974  
(tons/year)

	<u>Part.</u>	<u>SOx</u>	<u>CO</u>	<u>HC</u>	<u>NOx</u>	<u>Total</u>
<u>Salt Lake County</u>						
Highway Vehicles	1,015	400	266,000	29,000	10,600	300,000
Off-Highway Vehicles	255	582	1,327	960	2,777	6,901
Other Transportation Process	280	95	3,606	1,482	4,465	9,329
Industries	15,968	213,890	431	3,709	7,658	241,656
Burning Solid Waste	680	190	1,300	410	247	2,827
Space Heating	2,096	3,314	862	308	2,450	7,827
Electric Power Generation	544	3,742	278	72	5,259	9,895
Dirt Roads	220	--	--	--	--	220
Forest Fires	67	--	235	78	8	388
Miscellaneous	1,637	--	--	1,319	--	2,956
COUNTY TOTAL	22,764	222,000	274,000	37,200	34,500	
<u>Tooele County</u>						
Highway Vehicles	118	41	23,263	2,826	1,358	27,606
Off-Highway Vehicles	24	55	127	91	358	655
Other Transportation Process	14	32	167	56	210	479
Industries	3,053	132	68	10	803	10,620
Burning Solid Waste	70	10	380	120	10	590
Space Heating	150	178	130	30	80	650
Electric Power Generation	--	--	--	--	--	--
Dirt Roads	1,470	--	--	--	--	1,470
Forest Fires	684	--	2,323	805	81	3,893
Miscellaneous	1	--	--	219	--	220
COUNTY TOTAL	5,715	448	26,500	4,157	2,904	

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### 5.3 South Area

TEAD-S is located south of the Great Salt Lake Air Basin, and little information is available regarding the influence of this air basin on the TEAD-S vicinity. The Air Basin Wind Study<sup>34</sup> states that the local wind conditions in the basin produce little exchange with external air, and the LWC is only a factor at higher elevations in the Rush Valley area.

EPA air quality classifications for TEAD-N are applicable to the south installation as well. TEAD-S, located in the southeast portion of Tooele County, falls within a Class II PSD designation. Deterioration of air quality would not be considered significant from moderate, well-planned growth under this classification.

Monitoring of air quality in the vicinity of the TEAD-S installation is intensive. The South Area maintains eight active monitoring stations around its perimeter. Continuous 24-hour monitoring of wind speed and direction,, SO<sub>2</sub>, nitrogen dioxide, anticholinest erase agents, ozone (one station), and particulates (five stations) is conducted. The operations of the stations were started in 1975.

Though most point sources in the region are in the Salt Lake area, a certain level of odoriferous pollution reaches the installation at TEAD-S even though its location is more remote than the North Depot Area, due to prevailing winds and other climatic conditions.

## 6. Water

### 6.1 Water Resources

#### a. North Area

Tooele Valley is part of a 4-square-mile drainage basin which also includes portions of the Stansbury, Oquirrh, and South mountains. The Great Salt Lake forms the northern boundary of the basin.

There are no major surface water bodies in Tooele Valley. Lesser surface water bodies include several small reservoirs and five perennial streams flowing from the adjacent mountains. Water from these streams is usually diverted for irrigation upon leaving the mountainous areas, but during rare periods of high runoff water flows into the valley in natural stream courses.

Ground water exists in th consolidated rocks of the mountains and in the unconsolidated valley fill. Both unconfined (water table) and confined (artesian) aquifers are found in the unconsolidated valley fill. Fresh water is found at varying depths throughout the valley; the greatest depths occur in the southern portions of the valley and near the mountains. Although there are several deep wells (200 to 630 feet) in the valley, approximately 65% of the existing wells have static water levels of 50 feet or less.

The major source of recharge to the valley aquifers is precipitation falling on the adjacent mountains, a portion of which migrates downward to the valley fill. Other recharge sources include limited precipitation falling on the valley floor, springs, irrigation, seepage from stream channels and mines, and subsurface flow from Rush Valley.

Wells, springs, and evapotranspiration provide the major sources of discharge. Ground water flows toward the center of the valley and then northerly, discharging a small amount of ground water into the Great Salt Lake.<sup>41</sup>

Ground water quantity increased slightly between 1963 and 1978 in Tooele Valley, probably due to an increase in precipitation and mine drainage. This increase is thought to be temporary, however, and some decrease is projected for the future. The amount of decrease will depend upon the ratio of discharge to recharge.<sup>35</sup> Development of new wells within Tooele Valley is restricted by the State of Utah. Except for special variances, new wells are limited to residential use at the rate of .015 cubic feet per second or seven gallons per minute.<sup>36</sup>

#### b. South Area

Rush Valley is directly south of Tooele Valley. Its drainage basin is considerably larger than Tooele Valley's basin, containing approximately 730 square miles. Rush valley contains several perennial mountain streams and reservoirs. Rush Lake, which is actually a depression in the northern portion of the valley and usually contains some water.

Both the consolidated rocks and the unconsolidated valley fill contain ground water and both unconfined and confined aquifers are found in the valley. There are few wells. Over 70% of the existing wells have static water levels of less than 50 feet.

Rush Valley and the surrounding mountains receive less precipitation than the Tooele Valley area and a smaller amount of the precipitation falling on the mountains migrates downward to recharge the aquifers. There is no known subsurface flow of ground water into the valley from neighboring valleys.<sup>37</sup>

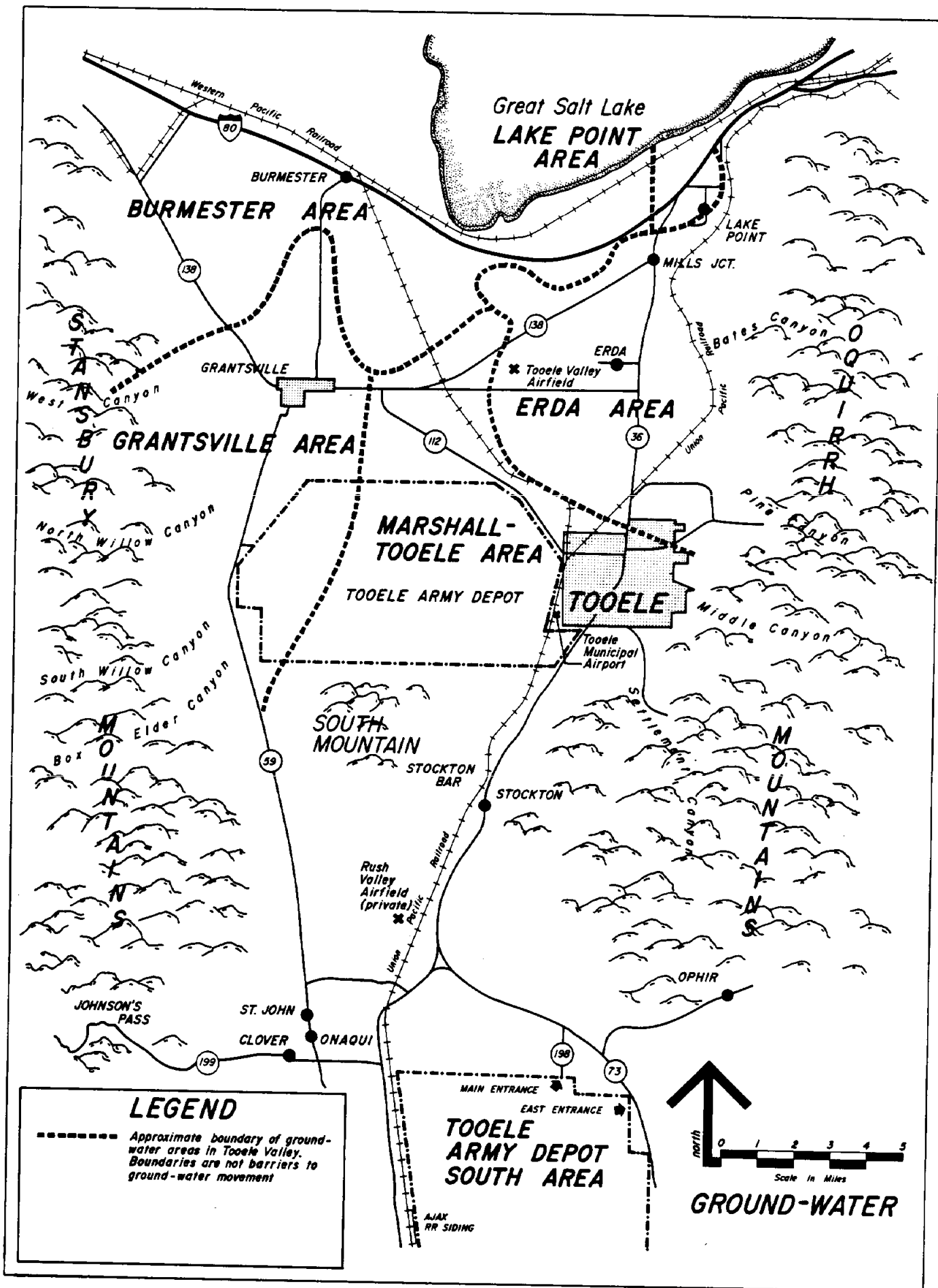
Because Rush Valley is sparsely populated, the major source of discharge (approximately 70%) is evapotranspiration. Ground water also flows into both Tooele Valley to the north and Cedar Valley to the east. Rush Valley contains a ground water divide, as shown on the map on the following page. Ground water to the north of this divide flows generally toward the north; ground water to the south of this divide flows generally toward the east.<sup>38</sup>

## 6.2 Water Quality

### a. Water Quality Standards

The State of Utah Department of Health has adopted and currently enforces the water quality standards recommended by the U. S. Environmental Protection Agency (EPA), with added restrictions on sulfates and total dissolved solids (TDS).

EPA has established recommended levels of sulfates and TDS at 250 mg/l and 500 mg/l, respectively. These levels are only recommended and EPA does not claim that high levels necessarily constitute a health hazard. However, the State of Utah established maximum contaminant levels (MCL) for sulfates and TDS, maintaining that concentrations above the MCL represent a health hazard. MCLs of 1,000 mg/l for sulfate and 2,000 mg/l for TDS have been established. Concentrations of sulfate above 1,000 mg/l could have severe laxative effects



and lead to dehydration. The 2,000 mg/l TDA represents an operational problem. AT and above this concentration water system equipment (pumps, valves, piping, faucets, etc.) experience increased operation and maintenance problems which may lead to failure to the system. This could result in a serious health problem.

As a further standard, use of water with a sulfate concentration greater than 500 mg/l and TDS concentration greater than 1,000 mg/l must receive special approval from the state. Special approval may require the installation or use of special equipment, as well as operational and maintenance procedures.

With these exceptions the State of Utah water quality standards are identical to those of EPA. The state's standards are listed in Table 14.

#### b. North Area

Water within the Tooele Valley have generally been of an acceptable quality for agricultural and culinary purposes. Water is available within two primary aquifers. A shallow (18- to 20-foot) aquifer is perched over a fine-grained stratum and water from this zone is usually available in small quantities and is of poor quality. The poor quality is a result of high sulfate and chloride concentrations, probably due to the dissolving of mineral matter as water moves through fine-grained beds. The deeper aquifer (338 to 623 feet) provides a significant quantity of better-quality water. The Salt Lake office of the USGS is of the opinion that no mixing occurs between the shallow and deep aquifers.

Past sampling and testing of the aquifers have indicated dissolved solid concentrations ranging from 238 to 2,180 milligrams per liter (mg/l) with most of the water containing less than 1,000 mg/l. Principal constituents of the water in Tooele Valley are calcium and bicarbonate, but magnesium and chloride predominate in some areas.

Water in Tooele Valley can be classified into three major groups, depending upon its location. The southwest portion of the valley contains water of a calcium magnesium bicarbonate type. A sodium chloride type is typical of the north and central portion of the valley. The third group consists of a mixture of the first two. This mixture is probably the result of changes in water level gradients caused by pumping, inducing movement of water of the sodium chloride type into areas where the water is of the calcium bicarbonate type. Water of the calcium magnesium bicarbonate type (a mixture of calcium magnesium bicarbonate and sodium chloride) displays a dissolved solids concentration less than 1,000 mg/l. Water of the sodium chloride type has a dissolved solids concentration of 1,000 to 3,000 mg/l in the center of the valley, and 500 to 1,000 mg/l in the northern part of the valley. Dissolved solids concentrations near the Depot are mapped on the following page.

The center of Tooele Valley has the poorest-quality water with the exception of wells discharging near the Great Salt Lake. This is a result of the small amount of recharge from the south-central margin of the valley. (Recharge from the adjacent mountains typically has a lower dissolved solids range, 200 to 338 mg/l, providing dilution to other portions of the valley.)

TABLE 14  
STATE OF UTAH WATER QUALITY STANDARDS

<u>Constituent</u>	<u>Chemical Standards</u>	
	<u>Maximum Contaminant Level<sup>1</sup></u>	<u>Proposed Secondary Level<sup>2</sup></u>
Iron	--	0.3 mg/l
Manganese	--	0.05 mg/l
Sulfate	1,000 mg/l <sup>3</sup>	250 mg/l
Chloride	--	250 mg/l
Fluoride	2.0 mg/l	--
Nitrate as N	10. mg/l	--
Total dissolved solids	2,000 mg/l <sup>3</sup>	500 mg/l
pH	--	[6.5 or ]8.5
Color	--	15 platinum Cobalt units
Turbidity (surface water, ground water)	1, 5 JTU	--
Foaming agents (detergents)	--	0.5 mg/l
Arsenic	0.05 mg/l	--
Barium	1. mg/l	--
Cadmium	0.010 mg/l	--
Chromium	0.05 mg/l	--
Copper	--	1 mg/l
Lead	0.05 mg/l	--
Mercury	0.002 mg/l	--
Selenium	0.01 mg/l	--
Silver	0.05 mg/l	--
Zinc	--	5 mg/l
Endrin	0.0002 mg/l	--
Lindane	0.004 mg/l	--
Toxaphene	0.005 mg/l	--

Notes:

<sup>1</sup>National Interim Primary Drinking Water Regulations (U. S. Environmental Protection Agency, 1975). Primary regulations are those which deal with constituents that may affect the health of consumers.

<sup>2</sup>National Proposed Secondary Water Regulations (U. S. Environmental Protection Agency, 1977). Secondary regulations are those which deal with the esthetic qualities of drinking water. These are guidelines only.

<sup>3</sup>Water with concentrations of sulfate greater than 500 mg/l and total dissolved solids greater than 1,000 mg/l require special approval for use.

Source: State of Utah, Department of Environmental Health.

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No significant changes in water quality have been observed in Tooele Valley, although some changes have been observed at individual wells. The heavily pumped Erda area has experienced an increase in chloride and sulfate concentrations probably related to the movement of the sodium chloride type of water into the area as a result of the heavy pumping. The increase in sulfate could also have resulted from recharge from either the Elton tunnel or mine discharge in Pine Canyon.

The area southwest of Tooele experienced increase in dissolved solids from 843 mg/l in 1957 to 1,383 mg/l in 1977. At the same time the sulfate and chloride concentrations increased. This change may be due to discharge from Honerine Tunnel, which is high in sulfate and chloride, or to the deterioration of the well casing, thus allowing poor-quality water to enter through previously unperforated well casing sections.

High sulfate concentrations have been found in two wells located northwest of the mouth of Pine Canyon. It is assumed that the source is the discharge from Elton tunnel or mine discharge at Pine Canyon. Samples of mine discharge water have shown a sulfate concentration of 560 mg/l.

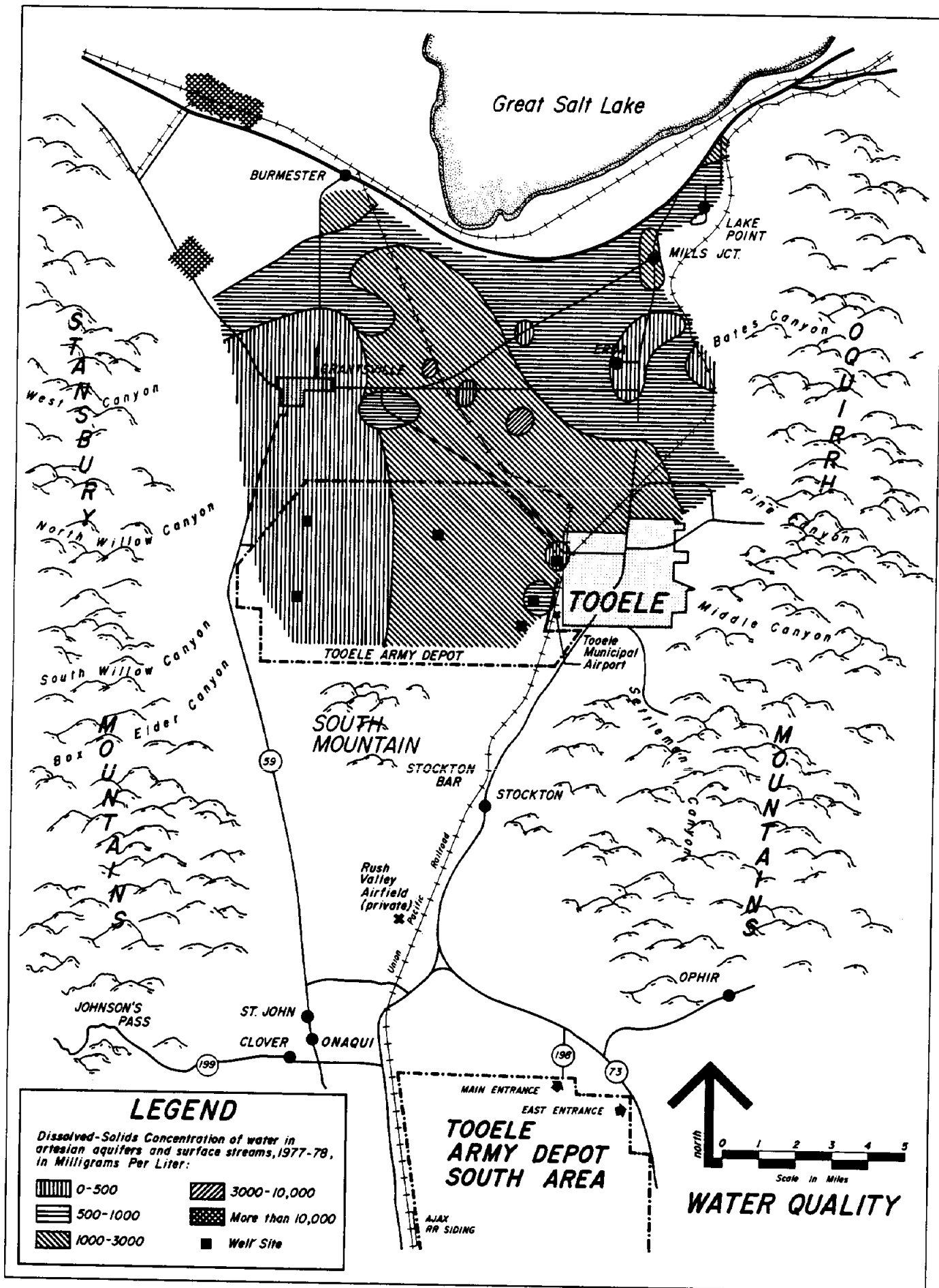
North and northwest of the City of Tooele, water from wells contained high chloride concentrations. This may have resulted from the upward leakage of water containing high chloride concentrations along faults or the presence of soluble salts of chlorides in the sediments of the area.

#### c. South Area

Water quality in Rush Valley varies within the drainage basin. Generally, dissolved solids concentrations range from 200 to 2,180 mg/l. Mountain springs and streams maintain a uniform dissolved solids concentration in and near the mountains, while the concentration of dissolved solids in the valley areas may vary from one part to another. Dissolved solids concentrations near the Depot are mapped on page 58.

Principal constituents of the mountain areas are calcium and bicarbonate with dissolved solids ranging from 200 to 338 mg/l. The valley areas typically have a higher dissolved solids concentration, ranging from 238 to 2,180 mg/l with the majority of the water less than 1,000 mg/l. Principal constituents are calcium and bicarbonate, although magnesium, sodium, and chloride are principal substances in some cases.

Much of the water in Rush Valley contains one or more constituents that exceed concentrations recommended by drinking water standards. These include sulfates, chlorides, and manganese. The concentration of iron plus manganese exceeded the limits in many of the supplies. Nitrate concentrations were within recommended limits while fluoride concentrations exceeded standards in two supplies. Most of the water in Rush Valley is classified as very hard by the U. S. Geological Survey. The Great Salt Lake Formation underlies parts of Rush Valley and may contribute to local variations in water quality.



The Faust Creek area, located in the central valley south of TEAD-S, experiences different principal constituents with varying concentrations of dissolved solids. Low dissolved solids concentrations (344 to 503 mg/l) have magnesium and bicarbonate as principal substances, whereas higher concentrations of dissolved solids (767 to 2,180 mg/l) have sodium, magnesium, and chloride as principal constituents.

The Morgan Ranch area, located in the northern portion of Rush Valley and north of TEAD-S, has dissolved solids concentrations of 368 to 1,040 mg/l. Calcium and bicarbonate, sodium bicarbonate, and chloride and sodium bicarbonate are the principal constituents of this area.

## 7. Flora

### 7.1 North Area

Climate has had a profound influence on the flora of Tooele Valley. Drought conditions are especially critical to plant growth and reproduction. The lack of precipitation, low humidity, and light winds have forced plants to adapt to a very high rate of evapotranspiration.

Temperature is also critical in the growth and reproduction of plants in the area. The first killing frost is October 25 and the last is April 1 on the average.<sup>41</sup> Most plants in the area are either dormant (perennials) or in seed from (annuals). The heat of the summers cause many of the plants to enter another period of dormancy. These climatic conditions limit the periods of growth and reproduction to the cooler, wetter periods between April 1 and October 25, unless they are adapted like phreatophytes, which tap ground water.

Soils are a significant determinant of flora in the area. Some of the soils are nearly impervious to water and root action. Other soils lack sufficient nutrients to support much plant life. Soils may also have a limiting pH; most of the area's soils are alkaline. In addition, saline soils exist in numerous areas. Many plants have adapted to these conditions as well as low soil moisture, lack of humus, high mineral iron content, and varying soil depths and types; but these factors also tend to limit the number of plants.

Soil types often determine erosion. Erosion and vegetation in the area have a cyclic cause-and-effect relationship. Erosion begins when the vegetation is destroyed, as happened during the Granstville Dust Bowl. Erosion removed the soil and kept the plants from reintroducing. The flora changed as new species out-competed old on the partially eroded areas. (The highly eroded areas were fenced and reseeded.)<sup>42</sup>

Topography also influences flora. Some species have developed preferences for slopes or flat areas. In addition, the amount and speed of runoff, which are largely determined by topography, are critical biological factors.

Surface water in the area is limited. Lack of surface water and topsoil moisture has forced root adaptations, such as the development of roots reaching ground water and the development of plants with expanded shallow roots that gather precipitation quickly after a rainfall. Surface water also leaches out minerals and due to rapid evaporation, mineral salts are concentrated on the surface or just below it.

TEAD-N is in the area classified as an *Artemisia* Boime, which is characterized by sagebrush (*Artemisia*) and saltbrush. This general classification is broken down into smaller areas based on predominant vegetation types and soil ranges.<sup>43</sup>

The Desert Bench Range has medium surface soil and slowly permeable subsoil. The dominant vegetation is winterfat, budsage, Indian ricegrass, and western wheatgrass. There are low areas within this range that support greasewood, shadscale, and gray Molly. In areas where puddling occurs after a heavy rainfall, greasewood and inkweed are dominant.<sup>44</sup>

The Sandy Hills Range has two soil types. The first and most westerly has moderately light surface soil texture and rapidly permeable subsoil. The dominant plants are juniper, low sagebrush, big sagebrush, ephedra, Indian ricegrass, sand dropseed, shadscale, and needle and thread grass. The second and central soil type has moderately light surface soil texture and rapidly permeable subsoil. Dominant vegetation consists of juniper, big sagebrush, ephedra, sand dropseed, and Indian ricegrass. In areas not covered by the juniper trees the dominant vegetation is big sagebrush, rubber rabbitbrush, bluebunch wheatgrass, Indian ricegrass and sand dropseed. The lower parts of both areas have big sagebrush, greasewood, gray Molly, shadscale, and horsebrush.<sup>45</sup>

The Foothill Range has three soil types. The first is in the eastern part of the range and has a gravelly surface condition consisting of gravel and cobble mixed with medium-textured soil material. The dominant vegetation is spiked wheatgrass, nature blue, thread and needle grass, western wheatgrass, Indian ricegrass, sweet vetch, balsam root, and yarrow. This area is being invaded by low sagebrush and big sagebrush. To the southeast the Foothill Range has medium-textured soil and moderately permeable subsoil. The dominant vegetation for this area is spiked wheatgrass, nature blue, needle and thread grass, western wheatgrass, Indian ricegrass, sweet vetch, balsam root, and yarrow. This range is also being invaded by Hologeton and cheatgrass. The third soil type is in the south and southwest areas of the range. It is gravelly or cobbly without medium-textured soil. The dominant species here are Indian ricegrass, spiked wheatgrass, nature blue, needle and thread grass, western wheatgrass, sweet vetch, balsam root, and yarrow. This area has pockets of sagebrush and shadscale.<sup>46</sup>

The Upland Loam Range has two soil types. The first, toward the southwest corner of the Depot, has medium surface soil texture and slowly permeable subsoil. The second, near the south boundary of the Depot, has moderate-textured surface soil with moderately permeable subsoil. In both areas the dominant plants are cheatgrass, Indian ricegrass, snakeweed, and fesque; also present are big sagebrush, bitter vetch, yellow brush, lupine, rabbitbrush, and paint brush.<sup>47</sup>

## 7.2 South Area

The area's climate also profoundly influences the flora in the vicinity of the South Area. Lack of precipitation during the growing season is the major factor in the type of species, number of individuals, and general productivity of the area. Plants have developed three adaptations to deal with the summer drought: drought resistance, tolerance, and avoidance. The temperature and freeze dates are basically the same as in Tooele Valley. The plants have also adapted to a moderately eroded soil, and some have adapted to alkaline soils.

The South Area is also in an area classified as an *Artemisia* Biome characterized by sagebrush and saltbrush. Most of the area around the base consists of shadscale/big sagebrush habitat. The dominant species varies, but both species are usually present. Some variety occurs in the associated species, which include saltgrass, crested wheatgrass, squirrel tail grass, Indian ricegrass, cheatgrass, and crested wheatgrass. In the northwestern part of the area, yellow brush is also associated.

On the valley floor near the southwestern corner of TEAD-S, vegetation is made up of alkaline-tolerant species: alkali sacaton, greasewood, nuttall saltbrush, and big rabbitbrush. Phreatophytes also do well as the ground water level is relatively close to the surface.

The outwash of Mercur Creek provides a more restrictive setting for vegetation, as it contains a brown-red soil that consists mainly of mine tailings. Toxic chemicals are present in the tailings and they inhibit vegetation growth.<sup>48</sup>

The Ophir Creek area and parts of its wash have another type of floral community. Vegetation along these strips is not dwarfed (sagebrush reaches eight feet instead of 20 inches).<sup>49</sup> Some small poplars and willows grow here.

## 8. Fauna

### 8.1 North Area

The condensed growth and reproduction of the plant communities in Tooele Valley limit the ecological niches available to animal species. Not only is competition for food sources severe during the hot, dry summer and winter dormancy periods, but the animals must be adapted to the same climatic conditions. They have adapted as hibernators, estivators, diurnals, or nocturnals, or have physiological adaptations that enable them to survive drought and heat, or cold and snow.

The vicinity of TEAD-N is inhabited by a wide variety of animal species ranging from protozoans to mammals, including 20 species of parasitic flatworms; 79 species of free-living, soil-inhabiting, or parasitic roundworms; 36 species of slugs and snails; 150 species of mites, ticks, spiders, pseudoscorpions, solpugids, and scorpions; 1,300 (and probably many more) species of insects; one species of amphibian; six species of lizard; two species of snake; 69 species of migrant birds; 11 species of winter resident birds; 71 species of summer resident birds; 63 species of birds in permanent residence; and 40 species of mammals. (See Appendix B.)

Insects provide many beneficial functions in a biotic community, such as pollinating vegetation and supplying an important link in the food chain. However, from man's point of view, most insects are considered as harmful or pests. Some, such as locusts, destroy crops; others, such as wasps, are poisonous; other, such as fleas and lice, are vectors for disease; and still others, such as gnats and ants, are simply irritating. Most insects are entirely unnoticed. Insects are extremely divers and they are adapted to almost every environmental niche from housing to the desert alkaline soil. They are prodigious producers; their life spans are generally short and reproduction is extremely high. The locust infestations that are historically recorded by the Mormons are an example of what is know as negative productivity.

There are many other pests in Tooele Valley. English sparrows, starlings, and rock pigeons have been introduced in the area and often outcompete natural species, thereby becoming pests. Coyotes may be regarded as pests by stockmen, but their predation on livestock is extremely limited and they help maintain the rodent and rabbit (lagamorph) populations. Rabbits are also considered pests in many areas as they forage on agricultural crops. The rabbit population drastically increase, then decreases, in six- to eight-year cycles.<sup>53</sup>

Most rodents are considered pests as well. They also may forage on agricultural crops. Additional damage is done by deer mice, wood rats, harvest mice, house mice, and Norway rats from gnawing on a variety of material. Rodent burrows are subject to wind erosion and are troublesome especially when next to equipment.<sup>52</sup> Rodents and rabbits are a reservoir for many diseases.<sup>53</sup>

Several species of game animals exist in the vicinity of TEAD-N. Mule deer, mountain cottontail, and desert cottontail inhabit the area. Furbearing animals include coyote and bobcat. Game birds include sage grouse, Gambil's quail, sharp-tailed grouse, blue grouse, ruffed grouse, and the imported ring-necked pheasant and chukar. In addition to the local game birds there are 37 species of migratory waterfowl that use the flyways through the Depot.<sup>54</sup>

Several species have been eliminated from the area, including bison, grizzly bear, elk, black bear, pronghored antelope, and mountain sheep. The mountain sheep, pronghorned antelope, and elk have been or are being reintroduced, mainly in the mountains.<sup>55</sup>

There are 603 verified species of vertebrate wildlife in Utah. Of these, 507 are protected by the Division of Wildlife Resources of the Utah State Department of Natural Resources, including all birds, fish, amphibians, reptiles, and 29 mammals.<sup>56</sup> Off-base hunting is permitted for all 57 game species (in season) and population control is largely due to hunter pressure. Management is achieved by varying the length of the season, the number of licenses, and limits.<sup>57</sup> The Division of Wildlife Resources participates in range rehabilitation; studies the effects on wildlife of livestock grazing; stocks streams, ponds, and reservoirs with adapted fish; constructs desert mountain guzzlers; releases chukars and Hungarian partridge in adapted areas; develops waterfowl management areas; surveys game species; and reintroduces elk, mountain sheep, and pronghorned antelope.<sup>58</sup> The Division of Wildlife Resources also regulates trapping under Section 23-13-2(28) of the Utan Code Annotated, as amended.

Two threatened or endangered species are known to be in the vicinity of TEAD-N: bald eagle and peregrine falcon.

Bald eagle habitat in the area is considered critical, encompassing and extension area in Utah including the Depot. The area needed by the bald eagle to roost, hunt, behave normally without disruption, and provide shelter is relatively large and encompasses many small habitats.<sup>59</sup> Bald eagles are protected by United States Code 16, Section 558-668d.

Peregrine falcons have been sighted in the area. The range of peregrine falcons has been shrinking due to housing and agricultural pressure. Its prey is being depleted by the use of pesticides and rodenticides, especially substances containing the dioxin TCSS, PCB, mercury, or lead.<sup>60</sup> Peregrine falcons are protected by the Endangered Species Act.

Zoonotic (transmittable from animals to man) diseases reported in the area are tularemia, rabies, Rocky Mountain spotted fever, Q fever, brucellosis, encephalomyelitis, plague, psittacosis, Anthrax, and hyated disease. (See Table 15.) The instance of disease in the area is lower than in most of the country, probably due to climate and elevation. Tularemia is an exception; one of the world's epicenters for tularemia is Delta, Utah. There was an outbreak in Grantsville and Delta in 1970.<sup>61</sup>

## 8.2 South Area

The South Area is separated from the North Area by only the Stockton Bar and South Mountain. The climate, topography, elevation, soils, and other environmental factors are relatively similar. For this reason, the fauna in the area are similar to those in the vicinity of the North Area. Bald eagles are somewhat more common near the South Area. An outbreak of the Antrax occurred near Stockton in 1972 and is through to be endemic in the cattle population of the area, probably stemming from cattle brough there in the 1860s.<sup>62</sup>

## 9. Noise

### 9.1 North Area

The noise environment of Tooele Valley in the vicinity of TEAD North is influenced primarily by activities associated with certain types of land use. The important use categories in terms of noise are open space (agricultural and grazing land), built-up areas (Grantsville and Tooele City), and transportation networks (highways, rail lines, and airports).

The noise environment of the open space areas (which predominate in the valley) is quiet with average noise levels of less than 40 decibels on the A scale (dBA). This includes the areas surrounding TEAD North to the south, west, and north (with the exception of the northeast portion which abuts Tooele City). Except for occasional vehicular traffic along SR 59 (west side of TEAD-N) and aircraft overflight, there are no permanent noise sources in these area. The open space area east of TEAD-N and SR 36 is also quiet but is influenced by vehicular and rail traffic along SR 36 and the Union Pacific line.

TABLE 15  
ZOO NOTIC DISEASES KNOWN TO OCCUR IN TOOEELE VALLEY

<u>Disease</u>	<u>Reservoir</u>	<u>Vector</u>	<u>Disease-carrying Species</u>
<u>Talaremia</u> <u>francisella</u> <u>tularensis</u>	Rabbits Small rabbits	Tabinids Ticks	Livestock, foxes, badgers, mule deer, owls
<u>Plague</u> <u>Pasteurella</u> <u>plestis</u>	Deer mice (appear to have some immunity)	Fleas	Deer mice, voles, ground squirrels, rabbits, foxes
Q Fever <u>coviella</u> <u>burnettia</u>	Deer mice Kangaroo rats	Ticks	Livestock, deer, foxes, wood rats, coyotes, ground squirrel, other mice
Rocky Mountain Spotted Fever <u>Rickettsia</u> <u>rickettsia</u>	Deer mice Rabbits	Ticks <u>Dermacentor</u> <u>parumepertus</u>	Deer mice, jackrabbits, cotton- tails, kangaroo rats, volves, ground squirrels, mule deer, cattle
Arboviruses; Western, Eastern, and Venezuelan Equine Encepha- litis; and Chikungunza	Rabbits	Mosquitoes	Rabbits, chipmunks, ground squirrels, kangaroo rats, harvest mice, wood rats, deer mice, badgers, and cattle
Psittacosis	Birds		Birds, some rodents
Anthrax <u>Bacillus anthracis</u>	Wood rats		Wood rats, livestock
Hyated Disease <u>Echinococcus</u> <u>granulosa</u>	Sheep	Infested feces, carrion grass	Sheep, dogs, coyotes
Rabies	Bats	Bite-saliva	Low in skunks, foxes, mammals, high in bats

Sources:

1. U. S. Army Environmental Hygiene Agency; "Plague Surveillance Study No. 16-66-0578-80, Rodent and Flea Surveys, Tooele Army Depot"; Tooele, Utah; 1980.
2. Dale King and Carlos Pinkham, PhD; "Installation Environmental Impact Assessment for United States Army Dugway Proving Ground"; Dugway, Utah' updated July, 1979.
3. H. J. Egoscue, "Study of the Ecology and Epizootology of Native Fauna of Great Salt Lake Desert", University of Utah, 1969.

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Grantsville (approximately two miles north of TEAD-N) and Tooele City (adjacent to the northeast portion of TEAD-N) have noise environments characterized by various types of human activity. The primary noise influence is vehicular traffic along local streets. Typical noise levels generated by individual automobiles on neighborhood streets range from 56 to 65 dBA 50 feet from the source. Other typical human activity generates noise levels at 65 dBA or less. With little human activity in a residential neighborhood, the average noise levels could drop near the levels of undeveloped areas (36 to 40 dBA). Noise levels in business areas, however, are more heavily influenced by frequent vehicular traffic and are higher on the average than the levels of residential neighborhoods.

There are many events in an urban setting which can increase the noise environment above the norm for relatively short periods of time. Automobiles traveling at higher than average speeds create noise greater than 65 dBA. For example, an automobile traveling at 35 mph typically generates noise of approximately 71 dBA 50 feet from the source. Automobiles with defective mufflers also generate noise levels. Heavy trucks traveling less than 35 mph generate noise levels as high as 80 to 82 dBA. Rapid acceleration of a truck generates noise levels above 90 dBA. Construction activity also typically generates high noise levels.

Aircraft traffic at Tooele Municipal Airport or Tooele Valley Airport is not a significant source of noise in the area. No jet aircraft are presently operating out of either facility and the existing traffic is of relatively low volume. The noise impacts of aircraft operations can be broken into four major activity phases: taxi, run-up and take-off, cruise, and landing. Of these operations, take-off is the most noise-intensive. Typical noise levels of multi-engined propeller aircraft during take-off range between 79 and 92 dBA 1,000 feet from the source; cruise levels average 63 to 68 dBA 1,000 feet above ground; and landing noise levels are between 70 and 80 dBA 1,000 feet from the source.<sup>63</sup>

According to the Metropolitan Airports System Plan (May, 1981) for Salt Lake City, Tooele Valley Airport may eventually be expanded and accept larger propeller and jet aircraft. This would increase noise level particularly at the landing and take-off ends of the runway. No noise impact evaluation of this potential expansion has been completed at this time, however.

Vehicular traffic along SR 112 and SR 36 consists of automobiles and trucks. These sources affect the noise environment along the path of the right of way, resulting in momentary intrusions as vehicles pass by the observer. As the number of vehicles increase over a given period of time, they contribute to a rise in the average noise levels of the area along the right of way. Typical noise levels generated by automobiles on highways at 50 mph range from 64 to 80 dBA 50 feet from the source.<sup>64</sup> Truck traffic of 50 mph generates noise levels ranging from 70 to 95 dBA.<sup>65</sup> Because of the relatively low volumes of traffic along SR 36 south of Tooele City and along SR 112, the overall noise level along these routes is relatively low.

Noise generated by railroad operations is limited to the right of way along the eastern boundary and at the northeast corner of TEAD-N, and along the western limits of Tooele City. Since both the Union Pacific and Western Pacific railroads generate low volumes of rail traffic along their respective

route segments, the impact on overall noise levels is not significant. In other words, the noise impact is relatively frequent and of short duration. Typical noise levels generated by freight trains range from 88 dBA (diesel electric locomotive) and 80 dBA (freight cars) 50 feet from the source.<sup>66</sup>

## 9.2 South Area

There are no significant noise sources in the vicinity of the South Area. SR 36, SR 73, and the Union Pacific Railroad generate noise levels similar to those discussed under TEAD North. The traffic volumes are substantially lower in the vicinity of the South Area than near the North Area, however. The communities of Onaqui, Clover, and St. John are located approximately two miles to the northwest, but they are residential in character with no significant noise generators.

## B. The Human Environment

### 1. Population

Between the census years of 1970 and 1980 the population of the State of Utah increased by 37.9% to 1,461,037, as show in Table 16. This gain was the fourth highest statewide rate of growth in the country and the highest rate Utah has seen since the 1880s. Growth occurred in virtually every county of the state and was especially strong in non-metropolitan areas.

The Tooele Army Depot is located in Tooele County, which is one of five counties comprising the Wasatch Front Multi-County Planning District. The other counties in this district are Davis, Morgan, Salt Lake, and Weber. The map on the following page shows the geographic jurisdiction of the Wasatch Front District.

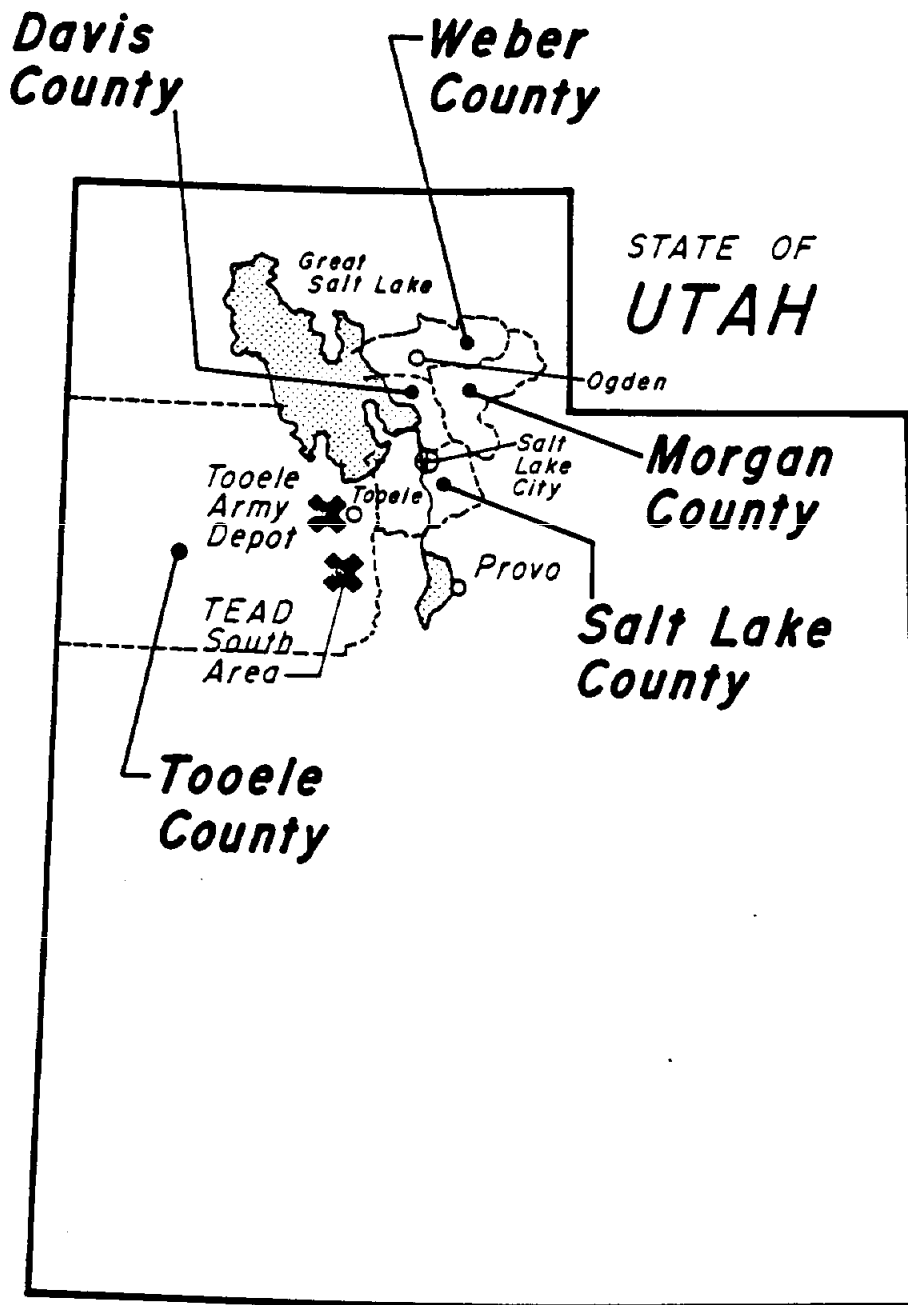
The Wasatch Front District is the most populous and urbanized district in the state. Collectively, these five counties contained 67% of the state's population in 1970 and 64.7% in 1980. Between 1970 and 1980 this district grew by 32.7% while the rest of the state grew by 48.6%. The district's growth was negatively impacted by population declines in the cities of Salt Lake and Ogden. At the same time smaller cities and unincorporated areas to the south and east of Salt Lake City outside the Wasatch Front District grew at rates of 50% or more in many cases. Within the Wasatch Front District, Davis County grew at the highest rate, predominantly along the I-15 corridor between Salt Lake City and Ogden.

TABLE 16  
POPULATION GROWTH IN UTAH AND THE WASATCH FRONT  
1960-1980

	<u>1960</u>	<u>1970</u>	<u>% Change</u>	<u>1980</u>	<u>% Change</u>
Utah State	890,627	1,059,273	18.9%	1,461,037	37.9%
Wasatch Front	579,244	709,441	22.5%	941,172	32.7%
Davis County	64,760	99,028	52.9%	146,540	48.0%
Incorporated Areas		85,044		134,875	58.6%
Morgan County	2,837	3,983	40.4%	4,917	23.5%
Incorporated Areas		1,586		1,896	19.5%
Salt Lake County	383,035	458,607	19.7%	619,066	35.0%
Incorporated Areas		229,162		313,835	37.0%
Tooele County	17,868	21,545	20.6%	26,033	20.8%
Incorporated Areas		17,337		20,869	20.4%
Weber County	110,744	126,278	14.0%	144,616	14.5%
Incorporated Areas		113,272		125,578	10.9%

Source: U. S. Department of Commerce, Bureau of Census, 1980 Census of Population and Housing; March, 1981.

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**WASATCH FRONT  
MULTI-COUNTY  
PLANNING DISTRICT**

Tooele County, west of Salt Lake City, exhibited a slower growth rate than most other Wasatch Front counties. Its 20.8% rate was much more in line with other arid counties in northwestern Utah. The lack of significant employment generators and the arid nature of these counties have prevented large population concentrations. In addition, the heavy federal ownership of land in this part of the state reduces the acreage available for private development. There are signs, however, that given the right conditions bedroom-type communities could develop in Tooele County servicing Salt Lake city. A notable example of this type of development is Stansbury park, a residential development on Highway 36 to Tooele.

Within Tooele County, growth was concentrated in areas along I-80 and in proximity to the Tooele Army Depot North Area. Cities in these areas such as Tooele, Grantsville, and Wendover had positive growth while the more southern areas of Stockton, Rush Valley, an Ophir experienced a definite population loss. A profile of growth within Tooele County is provided in Table 17.

TABLE 17  
POPULATION IN TOOELE COUNTY  
1970-1980

	<u>1970</u>	<u>1980</u>	<u>% Change</u>
Tooele County	21,545	26,033	20.8%
Unincorporated Areas	4,208	5,164	22.7%
Incorporated Areas	17,337	20,869	20.4%
Tooele City	12,539	14,335	14.3%
Grantsville City	2,931	4,419	50.8%
Wendover City	781	1,099	40.7%
Stockton Town	469	437	- 6.8%
Rush Valley Town	541	356	-34.2%
Vernon Town	NA	181	--
Ophir Town	76	42	-44.7%

Source: U. S. Department of Commerce, Bureau of Census, 1980 Census of Population and Housing; March, 1981.

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The minority population of the Wasatch Front region reached 73,200 or 8.8% of the population in 1980, as shown in Table 18. Approximately half of that number reside in Salt Lake County and approximately another 20% live in Weber County. Though small in number (3,100), the minority population of Tooele County makes up nearly 12% of the population. In all Wasatch Front counties the Hispanic population is the largest minority group. The smallest minority population in the region as a whole is the American Indian population, although in Tooele and Morgan counties the black population is the smallest population.

TABLE 18  
POPULATION BY RACE AND SEX  
1980

	<u>Utah</u>	<u>Wasatch Front</u>	<u>Davis County</u>	<u>Morgan County</u>	<u>Salt Lake County</u>	<u>Tooele County</u>	<u>Weber County</u>
<u>Both Sexes</u>	1,459,010	940,194	146,360	4,914	617,966	26,012	144,942
%	100.0	100.0	100.0	100.0	100.0	100.0	100.0
White	1,358,196	866,975	137,124	4,850	571,030	22,943	131,028
%	93.1	92.2	93.7	98.7	92.4	88.2	90.4
Black	9,053	8,545	1,749	-0-	4,321	156	2,319
%	0.6	0.9	1.2	-0-	0.7	0.6	1.6
Indian	18,042	5,373	422	15	3,743	468	725
%	1.2	0.6	0.3	0.3	0.6	1.8	0.5
Asian	18,078	14,046	2,182	24	9,893	208	1,739
%	1.2	1.5	1.5	0.5	1.6	0.8	1.2
Hispanic	55,641	45,255	4,883	25	28,979	2,237	9,131
%	3.8	4.8	3.3	0.5	4.7	8.6	6.3
Total Minority	100,814	73,219	9,236	64	46,936	3,069	13,914
%	6.9	7.8	6.3	1.3	7.6	11.8	9.6
<u>Female</u>	738,076	477,318	72,093	2,450	316,399	12,746	73,630
%	50.6	50.8	49.3	49.9	51.2	49.0	50.8
White	687,372	440,458	67,884	2,418	292,352	11,242	66,562
%	47.1	46.9	46.4	49.2	47.3	43.2	45.9
Black	4,392	4,134	665	-0-	2,215	76	1,178
%	0.3	0.4	0.5	-0-	0.4	0.3	0.8
Indian	9,013	2,692	189	7	1,898	229	369
%	0.6	0.3	0.1	0.1	0.3	0.9	0.3
Asian	9,111	7,076	1,016	12	9,893	208	1,739
%	0.6	0.7	0.7	0.2	0.8	0.4	0.6
Hispanic	28,188	22,958	2,339	13	14,872	1,097	4,637
%	1.9	2.4	1.6	0.3	2.4	4.2	3.2
Total Female Minority	50,704	36,860	4,209	32	24,047	1,504	7,068
%	3.5	3.9	2.9	0.7	3.9	5.8	4.9

Source: Utah State Department of Employment Security: Utah Affirmative Action Information; February 1981.

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Age distribution for Tooele County closely follows that of the rest of the Wasatch Front region (see Table 19), although its population is slightly younger. The proportion of people under 20 years of age is slightly higher, at nearly 43%, than the other Wasatch Front counties. In addition, the distribution shows relatively fewer aged persons in Tooele County.

TABLE 19  
AGE DISTRIBUTION  
1980

<u>Age Group</u>	<u>Male</u>	<u>Female</u>	<u>Total</u>	<u>%</u>
<u>Wasatch Front</u>				
Under 15 years	157,431	157,802	315,233	33.2
16 to 19 years	35,235	34,253	69,488	7.3
20 to 34 years	127,289	127,624	254,913	26.9
35 to 54 years	86,680	87,901	174,581	18.4
55 to 64 years	31,996	33,950	65,946	7.0
65 and over	28,024	40,027	68,051	7.2
Total	466,655	481,557	948,212	100.0
<u>Total County</u>				
Under 15 years	4,778	4,439	9,217	35.4
16 to 19 years	1,015	929	1,944	7.5
20 to 34 years	3,073	2,908	5,981	23.0
35 to 54 years	2,662	2,675	5,337	20.5
55 to 64 years	1,029	945	1,974	7.6
65 and over	697	883	1,580	6.1
Total	13,254	12,779	26,033	100.0

Source: Wasatch Front Regional Council, Special Tabulation from 1980 Census Tapes; U.S. Bureau of Census, January 1982.

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The State Planning Coordinator's Office (SPCO) projects an increase in Utah population of 56% between 1980 and 2000, as shown in Table 20. The Wasatch Front District is expected to account for 67% of that gain. Utah has always had relatively high birth rates, but the effects of in-migration will be increasingly important during the next 20 years. The growth in employment opportunities has historically been the major force in in-migration.

The SPCO projections reflect the future based on the existing economic structure . . . and trends of important changes, such as birth rates, migration rates, and labor force participation rates."<sup>67</sup> In interpreting these projections the State Planning Coordinator characterized the Wasatch Front District as having reached a new threshold of growth in the 1970s. "The size of the population in the area and the demands generated by it reached a range within which it became economically feasible to provide more goods and services to itself rather than importing them."<sup>68</sup> The prediction of future diversification and growth of the regional economy will eventually impact growth trends in the less populated Wasatch Front counties, including Tooele County.

TABLE 20  
POPULATION PROJECTIONS IN UTAH AND THE WASATCH FRONT  
1980-2000

	<u>Utah State</u>	<u>Wasatch Front</u>	<u>Davis County</u>	<u>Morgan County</u>	<u>Salt Lake County</u>	<u>Tooele County</u>	<u>Weber County</u>
1980	1,461,037	941,172	146,540	4,917	619,066	26,033	144,616
1985	1,750,500	1,134,100	205,000	7,200	169,800	33,900	190,000
% Change	19.8	20.5	39.9	46.4	12.8	30.2	31.4
1990	1,956,100	1,273,200	245,000	8,500	772,000	37,700	210,000
% Change	11.8	12.3	19.5	18.1	10.6	11.2	10.5
1995	2,117,300	1,384,000	272,000	10,000	834,000	40,000	228,000
% Change	8.2	8.7	11.0	17.7	8.0	6.1	8.6
2000	2,274,400	1,488,800	297,000	11,000	900,000	428,000	238,000
% Change	7.4	7.6	9.2	10.0	7.9	7.0	4.4

Source: U.S. Department of Commerce, Bureau of Census, 1980 Census of Population and Housing; and Utah State Planning Coordinator's Office, "Utah 2000: A high Development Scenario," March 1980.

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## 2. Housing

Between 1970 and 1980 housing stock in the Wasatch Front region expanded by 50.6% to a total of 316,605 units, as shown in Table 21. This rate of growth was slightly below the rate for the entire state. The regional average was pulled down by Morgan and Weber counties with rates of 26.1% and 29.9%, respectively. The fastest-growth counties were Davis (71.6%) and Salt Lake (53.7%). Tooele County occupied the middle of the range with a 1970 to 1980 growth rate of 32.7%.

Recent trends in regional housing production have been similar to national movements. The early and late 1970s experienced expanding housing production with a slump in the 1973 to 1975 period. The housing cycle peaked in 1978 and by 1980 the industry was in a severe retrenchment.

Building permit figures reveal the poor construction market of the last few years. In 1980 building permit issuance for all types of construction in the Wasatch Front region was 29.9% below the 1978 total, as compared to a statewide average decline of 19.4% (see Table 22). The largest declines were experienced in Tooele and Davis counties, which fell by 46.7% and 46.1%, respectively.

Non-residential construction fared better than residential construction in 1980, based on a stronger economic growth in Utah than in most other states. Also, experience has shown commercial construction is less responsive to interest rate increases in the short term than residential activity. Non-residential growth was centered in Salt Lake County, which sustained a

5.2% growth rate between 1978 and 1980. The other Wasatch Front counties all had less non-residential activity in 1980 than in 1978. Residential activity declined between 1978 and 1980 by 50% to 60% in all counties except Morgan County.

TABLE 21  
HOUSING UNIT GROWTH IN THE WASATCH FRONT  
1970-1980

	<u>1970</u>	<u>1980</u>	<u>% Growth</u>
Utah State	315,765	490,006	55.2%
Wasatch Front	210,265	316,605	50.6%
Davis County	24,223	41,566	71.6%
Morgan County	1,110	1,400	26.1%
Salt Lake County	139,593	214,572	53.7%
Tooele County	6,455	8,566	32.7%
Weber County	38,884	50,501	29.9%

Source: U.S. Department of Commerce, Bureau of Census, 1980 Census of Population and Housing, March 1981.

\*\*\*\*\*

Construction activity rebounded in the first half of 1981 relative to the same period the previous year, as shown in Table 23. Non-residential construction accounted for most of the strength in the first half, although activity is still at an historically low level.

In 1976 a housing inventory was done by the Wasatch Front Regional Council which determined that 30,000 units or 11% of the housing inventory were substandard (see Table 24). Relatively higher proportions of substandard units are located in major cities than in the rural counties.

Taking into account the replacement of some deteriorated units, as well as population growth, a projection of needed housing units were developed by the Council as shown in Table 25. When compared to the 1980 census figures these projections appear to be on the conservative side. Between 1976 and 1980 the projection underestimated growth in the more populous counties and overestimated growth in the smaller counties. Growth rates in households were estimated at from 2.8% to 4.8% per year over the next 10 years.

Data from the 1980 census show owner-occupied vacancy rates similar to the 1976 housing inventory in the Wasatch Front. All counties were exhibiting a tight market for owner-occupied homes. However, the vacancy rate for rental units was high in Tooele, Weber, and Salt Lake counties (see Table 26).

### 3. Economic Conditions

#### 3.1 Regional Economy

##### a. Retail Trade

TABLE 22  
BUILDING PERMIT ISSUANCE IN WASATCH FRONT  
1978-1980 (\$000)

	<u>Total Construction</u>	<u>Non- Residential</u>	<u>Residential</u>	<u>Unit</u>
Utah State				
1978	1,143,473	338,623	734,022	21,264
1979	1,232,105	490,274	645,810	16,767
1980	922,068	430,010	408,310	10,901
%	-19.4	27.0	-44.4	-48.7
Wasatch Front				
1978	728,335	216,216	463,139	13,641
1979	804,510	341,529	388,951	10,468
1980	510,860	227,528	220,386	6,454
%	-29.9	5.2	-52.4	-52.7
Davis County				
1978	136,968	40,877	91,316	2,392
1979	137,513	41,431	86,328	1,847
1980	73,801	20,610	47,653	1,084
%	-46.1	-49.6	-47.8	-54.7
Morgan County				
1978	1,739	742	894	25
1979	2,562	276	2,893	48
1980	1,475	125	1,229	2.8
%	-15.2	-83.2	37.5	12.0
Salt Lake County				
1978	455,102	126,338	298,254	9,490
1979	521,262	243,238	227,685	6,977
1980	344,883	163,571	140,431	4,657
%	-24.2	29.5	-52.9	-50.9
Tooele County				
1978	16,586	7,605	8,300	272
1979	10,253	2,151	7,163	198
1980	8,840	3,897	4,350	107
%	-46.7	-48.8	-47.6	-60.7
Weber County				
1978	117,940	40,655	64,375	1,462
1979	132,919	54,432	64,883	1,398
1980	81,861	39,325	26,723	578
%	-30.6	-3.3	-58.5	-60.5

Source: University of Utah, Utah Construction Report, Vol. 23, No. 4, 1980; Vol. 22, No. 4, 1979; Vol. 21, No. 4, 1978.

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TABLE 23  
CONSTRUCTION PERMITS IN THE WASATCH FRONT  
JANUARY-JUNE 1981  
(\$000)

	<u>Total Construction</u>	<u>Non- Residential</u>	<u>Residential</u>	<u>Unit</u>
Utah State	509,605	214,241	245,549	4,977
% change	50.8	49.9	52.0	14.5
Wasatch Front	255,946	120,768	134,615	2,444
% change				
Davis County	39,999	15,396	21,424	462
% change	38.4	70.7	24.1	16.4
Morgan County	946	81	723	17
% change	61.0	350.0	42.3	70.0
Salt Lake County	191,103	75,307	95,216	1,558
% change	54.0	36.2	78.7	-9.2
Tooele County	6,709	4,767	1,261	20
% change	31.4	110.5	-50.0	-54.1
Weber County	53,189	25,217	15,991	387
% change	34.2	6.3	43.3	48.3

Source: University of Utah, Utah Construction Report, Vol 24, No. 1 and 2, 1981.

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TABLE 24  
HOUSING INVENTORY IN THE WASATCH FRONT  
1976

	<u>Wasatch Front</u>	<u>Davis County</u>	<u>Morgan County</u>	<u>Salt Lake County</u>	<u>Tooele County</u>	<u>Weber County</u>
All Units	249,695	31,162	1,320	171,206	6,888	39,119
Substandard Units	39,118	3,488	126	30,664	688	4,152
% of total	15.7	11.0	10.0	17.9	10.0	10.6
Vacant Units	NA	546	NA	5,069	546	NA
% of total		2.0		3.0	2.0	

Source: Wasatch Front Regional Council, "Housing: A Regional Overview," June 1978.

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TABLE 25  
PROJECTED HOUSEHOLDS COMPARED TO  
THE 1976 HOUSING INVENTORY

	<u>Wasatch Front</u>	<u>Davis County</u>	<u>Morgan County</u>	<u>Salt Lake County</u>	<u>Tooele County</u>	<u>Weber County</u>
1976 Inventory	249,695	31,162	1,320	171,206	6,888	39,119
1980 Households	277,500	40,900	1,700	177,400	8,800	48,700
1985 Households	326,100	50,800	2,100	207,000	10,500	55,700
1990 Households	375,400	60,500	2,500	238,000	12,000	62,400
1995 Households	426,500	70,400	3,000	270,000	13,600	69,500
Cumulative Need	176,805	39,238	1,680	98,794	6,712	30,381

Source: Wasatch Front Regional Council, "Housing: A Regional Overview," June, 1978.

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TABLE 26  
SELECTED HOUSING CHARACTERISTICS  
IN THE WASATCH FRONT  
1980  
(Year-round units)

	<u>Utah State</u>	<u>Wasatch Front</u>	<u>Davis County</u>	<u>Morgan County</u>	<u>Salt Lake County</u>	<u>Tooele County</u>	<u>Weber County</u>
Total Units	490,006	316,605	41,466	1,400	214,572	8,566	50,501
Total Year-round units	480,744	316,019	41,549	1,381	214,266	8,529	50,294
Owner-occupied	317,172	209,260	31,095	1,132	137,350	5,821	33,862
Median Value	57,300	58,200	64,400	63,500	59,200	50,200	53,700
Renter-occupied	131,431	89,400	8,899	223	64,372	2,145	13,781
Median Rent	187	179	210	127	203	179	174
Vacancy Rate (%)							
Owner	2.6		2.1	1.0	2.9	1.9	2.0
Renter	7.8		4.8	1.8	7.7	10.8	8.2

Source: U.S. Department of Commerce, Bureau of Census, 1980 Census of Population and Housing, March 1981.

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Table 27 shows that retail sales in the Wasatch Front reached \$2.9 billion in 1980, a gain of 13.5% over 1978. This region captured 69% of Utah State retail sales in 1980, up from 68.6% in 1978. Salt Lake County is the major retail center for the region registering 71.4% of Wasatch Front sales in 1980; however, this was down from 72.5% in 1978. In fact, Davis County is the only Wasatch Front county which increased its percentage share of retail trade in the region during the two-year period. Declines in shares of regional sales were approximately 0.1% for each of the other three counties. Morgan and Tooele counties had the lowest shares of regional sales in 1980 with 0.1% and 1.4% respectively.

Both Davis and Weber counties exceeded Salt Lake County's retail sales growth rate in the 1st two years, with 28.9% and 12.8% rates, respectively. Morgan County turned in the worst performance in the Wasatch Front region, declining 19.7%.

Non-durable goods (i.e., consumer items with less than a three-year useful life) were the growth areas in retail sales in the 1978-1980 period. Food store sales grew in every county except Morgan, with the greatest gain in Weber County. Apparel and accessory sales experience strongest sales in Davis County as did general merchandise (department store) sales. While Davis County is only third in total sales volume, development of new retailing facilities and strong population growth caused the growth rate in non-durables to far exceed the larger retail centers. Eating and drinking place sales increased at a fairly even rate in the region, in the 20% to 30% range.

The major durables sector of furniture and furnishings grew by over 100% in Davis County, but exhibited slow or negative growth in the other counties. The sales of motor vehicle dealers and service stations declined throughout the Wasatch Front as did building materials sales.

Tooele County sales grew only 5.6% in the two-year period with general merchandise and food sales increasing by over 15%, while eating and drinking place sales grew by 31.7%. All other sale categories have declined in Tooele County Since 1978.

#### b. Agriculture

Collectively the Wasatch Front region produced nearly \$82 million in farm products in 1978, accounting for 17.5% of Utah agricultural production (see Tables 28 and 29). Relatively high shares of state production were achieved in this region for dairy products (17.8%), cattle (14.9%), and sheep and wool (13.1%). Grains and hay also are grown in this region and average a 9% to 10% share of state production.

Agricultural production within the region is centered in Davis, Salt Lake, and Weber counties. These counties accounted for 23%, 28% and 32%, respectively, of Wasatch Front production in 1978. Cattle and dairy products were centered in Weber County, while Tooele County had the largest share of sheep and wool production at 44%. Grain crop production was spread out relatively equally among Davis, Weber, and Salt Lake counties, with the exception of wheat which was centered in Salt Lake county. By 1981, wheat production had shifted substantially to Davis County, which increased from 14.3% to 40.1% of the regional market while Salt Lake County's contribution declined from 65.8% to 36.0%.<sup>69</sup>

TABLE 27  
RETAIL SALES TOTALS 1980 (\$000) AND  
PERCENTAGE GROWTH 1978-1980

	<u>Utah State</u>	<u>Wasatch Front</u>	<u>Davis County</u>	<u>Morgan County</u>	<u>Salt Lake County</u>	<u>Tooele County</u>	<u>Weber County</u>
Retail							
Trade	4,178,745	2,882,115	318,315	4,051	2,060,281	39,703	459,665
% Change	12.9	13.5	28.9	-19.7	11.9	5.6	12.8
Building							
Material	383,690	241,013	24,060	--	173,866	2,516	40,571
% Change	-1.0	-6.5	-6.0	--	-7.5	-24.3	-1.0
General							
Merchan-							
dise	551,280	371,179	34,935	--	268,397	4,030	63,817
% Change	8.7	6.6	62.0	--	4.4	15.1	-3.3
Food							
Stores	969,770	653,529	69,424	1,068	458,243	14,504	110,290
% Change	28.6	35.5	30.3	-4.3	33.2	16.7	54.5
Motor							
Vehicles							
& Gas							
Stations	712,954	490,672	71,476	2,430	332,445	8,543	75,778
% Change	-9.7	-10.2	-7.5	-30.6	-11.4	-12.5	-6.1
Apparel &							
Accessories	198,235	146,188	13,229	--	113,797	239	18,923
% Change	22.9	23.9	78.7	--	20.1	-8.1	21.4
Furniture							
& Fur-							
nishings	293,380	224,315	34,212	11	157,258	1,638	31,196
% Change	11.8	16.7	110.2	-21.0	8.7	-1.7	5.4
Eating &							
Drinking	419,438	293,384	23,018	256	222,980	3,986	43,144
% Change	26.6	27.8	28.1	32.6	28.8	31.7	22.3
Miscel-							
laneous	649,998	461,835	47,961	286	333,395	4,247	75,946
% Change	28.0	26.7	74.0	33.7	26.0	17.3	11.2
Total Retail							
& Non-Retail							
Taxable							
Sales	8,691,072	5,681,873	529,553	12,274	4,301,997	83,996	754,053
% Change	18.3	15.0	30.1	(6.2)	15.9	(3.8)	(8.4)

Source: Utah State Tax Commission, Gross Retail Sales and Purchases in the State of Utah, 1978 Through 1980; June, 1981.

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### c. Mining

The State of Utah produced non-fuel minerals valued at \$553.6 million in 1978 and \$753.4 million in 1979. Over half of that total is from copper production and an additional 15% is from gold and silver, which are principally recovered as by-products of copper production. For non-metallic minerals production leaders include cement, potash, salts, sand, and gravel.

Most mineral groups are represented in the Wasatch Front region with metals production centered in Salt Lake County and non-metals of various types centered in Tooele and Weber counties. As indicated by Table 30, Salt Lake County produced nearly 73% of all non-fuel minerals in Utah in 1978. Tooele and Weber counties produced 3.1% and 4.1%, respectively, of the state total. While these percentages seem low, Weber and Tooele counties are the second- and third-ranked counties in reported mineral production.

TABLE 28  
AGRICULTURAL PRODUCTION FOR UTAH AND THE WASATCH FRONT  
1978

	<u>Utah State</u>	<u>Wasatch Front</u>	<u>Davis County</u>	<u>Morgan County</u>	<u>Salt Lake County</u>	<u>Tooele County</u>	<u>Weber County</u>
Market Value of Farm Pro- ducts (\$000)	468,195	81,954	18,806	6,329	23,146	7,327	26,346
Average per Farm (\$000)	33,846	--	33,285	31,966	35,070	27,858	33,907
Sales(\$000)							
Cattle	168,082	25,029	7,844	1,167	2,329	3,317	10,372
Dairy	92,024	16,338	2,604	1,620	3,114	-0-	9,000
Hogs/Pigs	5,172	127	62	7	-0-	58	-0-
Sheep/Wool	30,886	4,142	53	1,221	916	1,815	137
Sales (bushels)							
Corn							
(grain)	1,194,596	119,860	28,685	--	59,813	8,120	23,242
Corn							
(silage)	1,040,928	102,478	38,271	5,121	21,324	4,268	33,494
Wheat	6,689,017	650,650	92,960	10,546	428,098	45,915	73,131
Oat	793,687	76,332	16,412	16,024	19,673	8,480	15,743
Barley	9,120,661	884,694	166,232	70,613	271,723	110,492	265,634
Hay Crops							
(tons)	1,780-972	188,792	36,969	19,892	48,821	32,248	50,862
Orchard Produce							
(lbs.)	32,142,256	2,257,320	513,920	--	1,011,876	--	731,524

Source: U.S. Department of Commerce, Bureau of Census, 1978 Census of Agriculture, Vol. 1, Part 44; May 1981.

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TABLE 29  
AGRICULTURAL PRODUCTION  
1978  
(Percentage of Wasatch Front)

	<u>Wasatch Front % of State</u>	<u>Davis County</u>	<u>Morgan County</u>	<u>Salt Lake County</u>	<u>Tooele County</u>	<u>Weber County</u>
Market Value of Farm Products <u>Sales (\$000)</u>	17.5	23.0	7.7	28.2	8.9	32.1
<u>Cattle</u>	14.9	31.3	4.7	9.3	13.3	41.4
Dairy Products	17.8	15.9	9.9	19.1	0.0	55.1
Hogs/Pigs	2.5	48.8	5.5	0.0	45.7	0.0
Sheep/Wool	13.4	1.3	29.5	22.1	43.8	3.3
<u>Sales (bushels)</u>						
Corn (grain)	10.0	23.9	0.0	49.9	6.8	19.4
Corn (silage)	9.8	37.3	5.0	20.8	4.2	32.7
Wheat	9.7	14.3	1.6	65.8	7.1	11.2
Oats	9.6	21.5	21.0	25.8	11.1	20.6
Barley	9.7	18.8	8.0	30.7	12.5	30.0
Hay Crops (tons)	10.6	19.6	10.5	25.9	17.1	26.9
Orchard Produce (lbs)	7.0	22.8	0.0	44.8	0.0	32.4

Source: U.S. Department of Commerce, Bureau of Census, 1978 Census of Agriculture; Vol. 1, Part 44, May 1981.

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TABLE 30  
VALUE OF NON-FUEL MINERAL PRODUCTION IN UTAH  
1978

<u>County</u>	<u>Value (\$000)</u>	<u>% of Total</u>	<u>Mineral Produced In Order of Value</u>
Davis	Withheld <sup>1</sup>		Sand, gravel, stone tungsten
Morgan	Withheld <sup>1</sup>		Cement, stone, sand, gravel
Salt Lake	403,007	72.9	Copper, molybdenum, gold, cement, silver, sand, gravel, salt, stone, lime, clay, lead, zinc
Tooele	17,972	3.1	Lime, salt, potassium salts, stone, sand, gravel, tungsten, magnesium compounds, clays
Weber	22,513	4.1	Potassium salts, salt, asphalt sand, gravel, sodium sulfate, magnesium compounds, clay, stone

Note:

<sup>1</sup>Values have been withheld to avoid disclosing proprietary data.

Source: U.S. Bureau of Mines, 1978-1979 Minerals Industry Yearbook.

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The Utah Copper Division of Kennecott Minerals Company is responsible for the majority of copper production in the state, as well as a host of by-product minerals. Their large open pit copper mine is located in Bingham, about 25 miles from Salt Lake City. Related facilities include the precipitation plant located at the mouth of Bingham Canyon; and 16 miles to the north, the Bonneville, Magna, and Arthur concentrators, the smelter, and the refinery. Kennecott is the largest employer in the state with 2,650 employees at the mine and 7,000 at the Utah Copper Division. A number of by-products are recovered from the copper ores including molybdenum, gold, silver, and sulfuric acid.

The Anaconda Company opened the Carr Fork Copper Mine in Tooele County in 1979. This is an underground mine and is adjacent to the Kennecott Bingham Canyon mine. Approximately 800 people are employed in this operation.

AMAX Specialty Metals recovers magnesium and chlorine by-products at its Rowley plant in Tooele County. The plant employs approximately 700 people in operations extracting the minerals from the waters of the Great Salt Lake.

Utah Marblehead Lime Company and Flintkote Company, located in Tooele County, are the largest lime producers in the state. However, the employment impact of these operations is not great, with combined employment of less than 100.

Numerous companies extract salt and other minerals from the Great Salt Lake in the Wasatch Front region. Producers include Great Salt Lake Mineral Company in Weber County; and Hardy Salt Company, Utah Salt Company, American Salt Company, and Lakepoint Salt Company in Tooele County. These are mostly small operations except the Great Salt Lake Mineral Company, which employs approximately 250 people.

### 3.2 Employment

The Wasatch Front region, which includes Tooele County, accounted for over 65% of the Utah labor force in 1980, employing 406,158 people as shown in Table 31. Of the five counties that make up this region, Salt Lake County has by far the largest labor force at 284,957, or 70% of the regional total. In contrast, Tooele County, with a labor force of 8,657, represents only 2% of the regional labor pool.

The unemployment rate for these counties in 1980 was in the neighborhood of 5% except for Weber and Tooele, which had 6.8% and 5.8%, respectively. This is a measure of unemployment among residents of the respective counties. In some cases enough jobs exist to fully employ residents but they are filled by commuters from other areas. For example, 36% of the civilian positions at the Tooele Army Depot are filled by non-residents of Tooele County.

In Tooele County the total number of persons employed in the county exceeds the resident labor force by 1,273, or roughly twice the number of unemployed residents (see Table 32). Salt Lake County also has a significant number of commuting workers as the number of employed persons exceeds the local labor force by 283 persons. In the other Wasatch Front counties resident employment outnumbers employment at job sites within the respective counties, indicating a daily migration of job workers to other counties. Weber County experiences the largest magnitude of such commuting to other counties.

TABLE 31  
LABOR FORCE AND EMPLOYMENT BY PLACE OF RESIDENCE  
1980

	<u>Utah State</u>	<u>Wasatch Front</u>	<u>Davis County</u>	<u>Morgan County</u>	<u>Salt Lake County</u>	<u>Tooele County</u>	<u>Weber County</u>
Labor Force	618,818	406,158	46,835	2,221	284,597	8,657	63,490
Total Employed	585,331	384,215	44,345	2,129	270,429	8,156	59,156
Unemployed	33,487	21,943	2,490	92	14,528	501	4,334
Unemployment Rate	5.4%	5.4%	5.3%	5.4%	5.1%	5.8%	6.8%

Source: Utah Department of Employment Security, Vol. III Labor Market Information, Utah Annual Report, 1980.

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TABLE 32  
EMPLOYMENT BY WORKPLACE LOCATION AND INDUSTRY  
1980

	<u>Utah State</u>	<u>Wasatch Front</u>	<u>Davis County</u>	<u>Morgan County</u>	<u>Salt Lake County</u>	<u>Tooele County</u>	<u>Weber County</u>
Total Non- agricultural	550,787	398,544	640,909	1,110	285,240	9,930	49,369
Mining	18,500	7,122	405	30	6,057	885	120
Construction	31,549	21,608	35,408	84	16,443	269	2,606
Manufacturing	87,700	60,121	93,622	363	46,182	1,094	6,899
Transportation, Communication, and Utilities	34,120	26,989	23,341	19	22,310	246	2,974
Retail/Wholesale Trade	128,678	95,898	86,807	293	74,464	962	11,333
Finance, Insur- and, Real Estate	25,768	20,770	9,537	43	17,483	167	2,176
Services and Miscellaneous	99,426	68,123	47,994	42	53,338	554	9,161
Government	125,046	88,823	343,796	236	48,963	5,753	14,100

Source: Utah Department of Employment Security, Vol. III Labor Market Information, Utah Annual Report, 1980.

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In the Wasatch Front region as a whole, 389,544 persons were employed in 1980, constituting 70.1% of Utah's employment. Again, Salt Lake County dominates the Front with 73.2% of regional employment, while Tooele County accounts for 2.6% of the regional total. The diversity of local employment patterns is detailed in Table 33.

TABLE 33  
PERCENTAGE OF NON-AGRICULTURAL EMPLOYMENT BY INDUSTRY GROUP  
1980

	<u>Utah State</u>	<u>Wasatch Front</u>	<u>Davis County</u>	<u>Morgan County</u>	<u>Salt Lake County</u>	<u>Tooele County</u>	<u>Weber County</u>
Total Non- agricultural	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Mining	3.4	1.8	0.07	2.7	2.1	8.9	0.2
Construction	5.7	5.5	5.0	7.6	5.8	2.7	5.3
Manufacturing	15.9	15.4	12.7	32.7	16.2	11.0	14.0
Transportation, Communication, and Utilities	6.2	6.9	3.3	1.7	7.8	2.5	6.0
Retail/Wholesale Trade	23.3	24.6	20.2	26.4	26.1	9.7	23.0
Finance, Insur- ance, Real Estate	4.7	5.3	2.1	3.9	6.1	1.7	4.4
Service and Miscellaneous	18.1	17.5	11.7	3.8	18.7	5.6	18.6
Government	22.7	22.8	45.0	21.3	17.2	57.9	28.6

Source: Utah Department of Employment Security, Vol. III Labor Market Information, Utah Annual Report, 1980.

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Industry employment patterns in the Wasatch Front region closely resemble those of Utah as a whole; however, the economies of individual counties are considerably less diverse. In percentage terms the manufacturing share ranges from 32.7% of employment in Morgan County to 11.0% in Tooele County. The high share in the former county is more a result of the underdevelopment of the finance and service sectors than of strong development of manufacturing, while in Tooele County the 11.0% share is the largest sector, except for government employment, due to mineral-related manufacture. The retail/wholesale trade sector is not well developed in Tooele County and accounts for only 9.7% of employment as compared to a state average of 23.3%. A similar situation exists in the service sector, which accounts for 5.6% of employment in Tooele County as compared to a state average of 18.1%. The government sector in Tooele County employs 57.9% of those with jobs, mainly at the Tooele Army Depot. It appears from this data that the local Tooele County economy is not capturing consumer sales and service expenditures due to the large number of non-resident workers in the county.

By contrast, Salt Lake County has a very well developed trade and service sector exceeding the state average in all cases. As a truck and service center for the region, Salt Lake County draws in dollars from surrounding areas. Morgan County also serves as a retail center to a lesser degree, but is not strong in services.

Table 34 shows much the same pattern in payrolls, with Tooele County strong in government, mining, and manufacturing, and Salt Lake County dominating trade and services, though also having a large manufacturing base.

Tooele Army Depot is easily the major employer in Tooele County, employing 4,137 people. The other major employers in the region are the Anaconda Company, employing 820 in copper mining, and Amax Speciality Metals, with 720 employees in magnesium production (see Table 35). According to a study recently done by the State Department of Community and Economic Development, Tooele's mining employers have a high wage structure, ranging from \$8.81 to \$9.72 per hour. They report little difficulty in filling unskilled positions but have some problems locating skilled employees.

TABLE 34  
NON-AGRICULTURAL PAYROLL WAGES  
1980  
(000)

	<u>Utah State</u>	<u>Wasatch Front</u>	<u>Davis County</u>	<u>Morgan County</u>	<u>Salt Lake County</u>	<u>Tooele County</u>	<u>Weber County</u>
Total Non-							
agricultural	7,345,961	5,371,622	640,909	14,216	3,971,301	151,392	593,804
Mining	424,322	173,144	405	415	147,999	21,487	2,838
Construction	524,862	361,193	35,408	1,503	280,689	4,139	40,175
Manufacturing	1,372,879	919,619	93,622	5,337	699,459	21,529	99,672
Transportation, Communication, and Utilities	666,720	539,725	23,341	545	455,109	4,263	56,467
Retail/Wholesale Trade	1,294,462	1,043,553	86,807	3,331	852,204	6,938	94,272
Finance, Insur- and, Real Estate	331,642	280,004	9,537	483	243,244	1,572	25,168
Services and Miscellaneous	1,054,168	766,546	47,944	336	620,552	4,064	93,600
Government	1,676,906	1,287,119	343,796	2,266	672,044	87,401	181,611

Source: Utah Department of Employment Security, Vol III Labor Market Information, Utah Annual Report, 1980.

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TABLE 35  
OTHER MAJOR EMPLOYERS IN TOOELE COUNTY

	<u>Product</u>	<u>Employment</u>
1. Tooele Army Depot	(Public)	4,137
2. Anaconda Company	Copper mining and milling	820
3. AMAX Speciality Metals	Magnesium production	720
4. Tooele School District	(Public)	710
5. Dugway Proving Grounds (Dugway)	(Public)	680
6. Catalina Sportswear	Mens's sportswear	95
7. Kaiser Chemicals	Potash and brine chemicals	60
8. American Salt	Salt production	60
9. Getty Oil Co.	Gold mining	50
10. Flintkote Company	Lime production	50
11. Lake Point Salt Co.	Salt production	50
12. Utah Marbelhead Lime Co.	Lime production	40

Source: Utah Department of Employment Security, "Directory of Utah Manufacturers, 1979-80"; Bureau of Economic and Business Research, University of Utah, "Tooele/Grantsville Labor Market Area," July 1981; Utah Industrial Development Division, "UTAH: County Economic Facts, 1980 Edition, Tooele County."

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Minority participation in the labor force in the Wasatch Front region is nearly 20 percentage points below the rate for whites, as shown in Table 36. Labor force participation is measured here by the labor-force-to-population ration because the data for a more valid methodology is not available. The minority participation rate is generally higher using this methodology due to the younger age structure of the minority population; however, it is useful for comparison. With the exception of Tooele and Davis counties, the participation rate for all races is nearly the state average of 42.6%. Tooele and Davis counties have rates lower than 33%. The minority participation rate is higher in the Wasatch Front counties than the state average. The black population in all counties showed a markedly lower participation level.

Unemployment statistics are shown in Table 37 for 1980. The unemployment rates for Tooele County are generally somewhat higher than the state average, particularly for Indian workers, of whom 17.6% were unemployed compared to the state average of 13.5%. However, total minority unemployment in Tooele County (8.6%) was less than the state average (9.4%) due to lower rates for blacks and Hispanics.

### 3.3 Personal Income

Personal income in the Wasatch Front region totaled \$6.9 million in 1979 (see Table 38) and has increased at about 16.7% per year since 1974. Salt Lake County was 67.6% of that total, while Tooele County, with \$162 million, was only 2.3% of the regional total. Tooele County experienced the least growth over the last five years of all Wasatch Front counties, amounting to about 12% per year. In terms of per capita income, Tooele County was the lowest among the five counties with \$6,782 as compared to Salt Lake County's \$8,204. It should be noted that these figures are for residents of these counties rather than commuting workers.

TABLE 36  
LABOR FORCE PARTICIPATION RATES  
1980

	<u>Utah</u>	<u>Wasatch County</u>	<u>Davis County</u>	<u>Morgan County</u>	<u>Salt Lake County</u>	<u>Tooele County</u>	<u>Weber County</u>
<u>Both Sexes</u>	42.6	51.2	32.5	45.1	46.3	32.9	43.5
White	43.1	45.0	33.0	45.1	46.9	33.6	44.4
Black	29.2	32.1	5.4	0.0	38.4	16.0	40.3
Indian	23.7	33.3	16.1	26.7	36.8	21.8	32.3
Asian	35.1	34.3	32.4	50.0	34.5	37.0	35.2
Hispanic	39.3	38.2	33.4	52.0	41.0	29.5	34.0
Minority Total	34.8	36.3	27.1	45.3	39.1	28.1	35.1
<u>Female</u>	33.4	34.7	26.2	32.0	36.6	26.3	36.7
White	34.0	35.1	26.7	45.1	46.9	33.6	44.4
Black	25.5	26.8	0.0	0.0	38.4	16.0	40.3
Indian	19.6	29.8	14.8	26.7	36.8	21.8	32.3
Asian	23.5	29.6	19.6	25.0	31.5	33.3	34.7
Hispanic	28.9	30.4	20.7	15.4	32.8	23.7	29.6
Minority Total	25.9	30.0	17.9	18.7	32.3	23.1	29.6

Source: Utah Department of Employment Security, "Utah Affirmative Action Information," February 1981; Haworth and Anderson, Inc.

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TABLE 37  
LABOR FORCE UNEMPLOYMENT RATES  
1980

	<u>Utah</u>	<u>Wasatch County</u>	<u>Davis County</u>	<u>Morgan County</u>	<u>Salt Lake County</u>	<u>Tooele County</u>	<u>Weber County</u>
<u>Both Sexes</u>	5.2	N/A	5.1	3.9	4.9	5.6	6.4
White	4.9	N/A	4.9	3.9	4.5	5.3	6.1
Black	10.5	N/A	7.4	0.0	10.5	8.0	9.2
Indian	13.5	N/A	7.4	0.0	12.2	17.6	32.3
Asian	5.1	N/A	5.4	0.0	5.4	6.5	6.5
Hispanic	9.7	N/A	9.9	7.7	10.5	7.4	10.7
Minority Total	9.4	N/A	8.4	3.4	9.6	8.6	9.9
<u>Female</u>	5.5	N/A	6.2	5.9	4.9	6.4	7.1
White	5.3	N/A	6.0	0.0	4.5	6.1	6.9
Black	10.0	N/A	7.5	0.0	10.8	8.3	9.6
Indian	13.2	N/A	7.1	0.0	12.6	16.7	11.2
Asian	5.6	N/A	6.0	0.0	5.5	8.8	6.5
Hispanic	9.6	N/A	11.0	0.0	10.4	8.5	9.8
Minority Total	9.5	N/A	9.4	0.0	9.6	9.5	9.4

Source: Utah Department of Employment Security, "Utah Affirmative Action Information," February 1981.

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TABLE 38  
PERSONAL INCOME BY PLACE OF RESIDENCE  
1979  
(\$000)

	<u>Utah</u>	<u>Wasatch County</u>	<u>Davis County</u>	<u>Morgan County</u>	<u>Salt Lake County</u>	<u>Tooele County</u>	<u>Weber County</u>
Total	9,818,927	6,892,740	982,205	33,981	4,658,995	161,566	1,055,993
Per Capita	7,182	7,200	7,235	7,193	8,204	6,782	7,648
Dividends, Rents, and Interest	1,163,202	818,550	79,179	5,524	590,197	10,986	132,644
Transfer Payments	1,149,905	779,174	101,618	4,168	478,644	24,559	170,185

Source: Utah Department of Employment Security, and U.S. Bureau of Economic Analysis, "Utah Personal Income 1929-1979," May 1981.

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Non-wage and salary sources of income for area residents include investment income, including: (1) dividends, rents, and interest; and (2) transfer payments which include government pensions and other payments to individuals. These two categories accounted for 11.9% and 11.3%, respectively, of the Wasatch Front region as a whole. The totals vary considerably from county to county, with Tooele County and Davis County exhibiting the lowest totals for investment income and Morgan County by far the highest. Transfer payments are well above the average in Tooele and Weber counties, and below average in Davis and Salt Lake counties.

While the income-by-residence figures reveal buying power within an area, income by place-of-work figures detail the structure of the local economy. In most cases the resident income figure exceeds the work place income figure because the former includes income for all sources and the latter includes only wages, salary, and proprietors' income. In the Wasatch Front region \$5.8 billion in personal income was generated at area work places, as shown in Table 39. Government employment generated the highest income figure of \$1.3 billion, while farm income was the lowest income generator at \$18 million. Tooele County's personal income was \$161 million or 2.8% of the regional total. Government was by far the largest sector in Tooele County, disbursing \$92.9 million in personal income.

Because of the higher wage structure in manufacturing and to a lesser degree in government, these sectors generate a higher proportion of area personal income than the employment numbers indicate. In the region as a whole the government sector accounts for 22.2% and manufacturing 16.0% of income. Retail and service industries generate 10.5% and 13.7% of Wasatch Front income, respectively. In Tooele County government employment is dominant with a 57.6% income share, while manufacturing and mining also are significant with 14.2% and 11.7%, respectively.

TABLE 39  
PERSONAL INCOME BY PLACE OF WORK  
1979  
(\$000)

	<u>Utah</u>	<u>Wasatch County</u>	<u>Davis County</u>	<u>Morgan County</u>	<u>Salt Lake County</u>	<u>Tooele County</u>	<u>Weber County</u>
Total	7,973,473	5,761,723	750,394	17,105	4,189,613	161,210	643,401
Farm	91,501	18,054	6,188	1,013	6,889	2,454	1,510
Mining	443,312	191,301	503	0	176,884	18,777	3,137
Construction	683,337	460,144	48,986	2,478	347,737	5,339	55,604
Manufac- turing	1,407,136	924,657	99,318	5,106	693,376	22,865	103,992
Transportation, Communication, and Utilities	707,748	572,925	26,972	741	480,258	3,710	61,244
Wholesale	560,664	493,040	37,245	0	434,693	631	20,471
Retail	840,320	604,869	54,925	873	457,067	7,976	84,028
Finance, In- surance, and Real Estate	399,198	334,601	15,778	519	283,972	1,969	32,363
Services	1,193,731	790,650	0	674	683,372	0	106,604
Government	1,630,976	1,280,457	393,078	2,209	619,290	92,852	173,028

Source: Utah Department of Employment Security and U.S. Bureau of Economic Analysis, "Utah Personal Income 1929-1979," May 1981.

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In Tooele and other Wasatch Front counties, the government sector has not grown as fast as aggregate income in recent years. The relatively rapid growth of other sectors indicates progress toward diversification in the area economy. Manufacturing grew strongly in the last five years, increasing by 112% in Tooele County and to a lesser degree in other counties (see Table 40). The finance, insurance, and real estate sector also increased strongly over the 1974 to 1979 period. Much of this growth was connected to the construction boom; however, other secondary sectors also experienced faster than average growth including services and transportation, communication, and utilities.

Income tax returns for 1979 show that all Wasatch Front counties had an average growth income figure higher than the state as a whole for that year (see Table 41). The highest figures are those for Morgan County at \$16,348. Tooele County was far below that figure at \$15,624, which was also the Salt Lake County figure.

Table 42 shows that income distribution of resident taxpayers in Tooele County was slightly higher than the statewide average in 1979, with 51.5% earning less than \$15,000 per year while the state average was 58%. The highest distribution was in Morgan County which had 48.8% in the under-\$15,000 category and nearly 13% in the over-\$50,000 class. Tooele County had only 0.6% in the over-\$50,000 category while the statewide average was 1.7%.

TABLE 40  
PERCENTAGE INCREASES IN PERSONAL INCOME BY PLACE OF WORK  
1978-1979

	<u>Utah State</u>	<u>Wasatch County</u>	<u>Davis County</u>	<u>Morgan County</u>	<u>Salt Lake County</u>	<u>Tooele County</u>	<u>Weber County</u>
Total	87.3	84.5	67.3	48.7	91.9	46.4	76.9
Farm	-3.2	20.7	98.9	-19.4	14.7	62.1	-46.1
Mining	131.8	I	I	D	79.3	D	D
Construction	111.0	97.2	116.0	209.0	96.2	-45.8	143.6
Manufacturing	95.5	94.3	97.2	65.3	91.7	112.4	108.6
Transportation, Communication, and Utilities	96.7	92.1	91.0	240.0	97.0	70.3	61.1
Wholesale Trade	91.5	95.4	D	D	82.1	D	75.6
Retail Trade	78.6	77.6	103.3	62.0	78.1	60.0	62.9
Finance, Insurance, and Real Estate	114.7	109.5	198.8	106.0	106.3	164.3	105.1
Services	106.4	91.8	D	23.9	105.3	D	102.9
Government	59.8	57.3	34.5	-3.7	89.8	22.3	47.6

Key:

I = incomplete data; D = not disclosed to protect confidentiality.

Source: Utah Department of Employment Security; U.S. Bureau of Economic Analysis, "Utah Personal Income 1929-1979," May 1981; Haworth and Anderson.

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TABLE 41  
1979 INDIVIDUAL INCOME TAX RETURNS

	<u>Utah State</u>	<u>Davis County</u>	<u>Morgan County</u>	<u>Salt Lake County</u>	<u>Tooele County</u>	<u>Weber County</u>
Gross Income						
\$5,000 or less	126,370	11,183	303	55,313	1,664	14,003
\$5,001 - 10,000	99,276	8,984	290	44,625	1,290	11,328
\$10,000 - \$15,000	75,799	6,804	202	34,374	1,122	8,484
\$15,001 - \$20,000	67,709	6,718	248	29,527	1,234	8,451
\$20,001 - \$25,000	56,312	6,210	231	25,086	1,069	6,734
\$25,001 - \$30,000	38,024	4,475	157	16,981	707	4,607
\$30,001 - \$50,00	43,836	5,462	174	20,427	776	5,388
\$50,001 - \$100,000	7,426	650	21 <sup>1</sup>	4,229	48 <sup>1</sup>	640
Over \$100,000	1,490	93		971		116
Average Gross Income	15,032	15,989	16,348	15,624	15,624	15,048

Note:

<sup>1</sup>Over \$50,000.

Source: Utah State Tax Commission, "Utah Statistics of Income, Individual Income Tax Returns, 1979 Return Year", May 1981.

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The percentage of people below the poverty level in the Wasatch Front region was estimated at 6.6% in 1980, which was well below the state average of 8.0% (see Table 43). Salt Lake County had the highest number and percentage of people in poverty, in spite of having the highest per capita income in the region. In contrast, Tooele County, in spite of its low per capita income figure, is well below the average with respect to the rate of poverty.

TABLE 42  
PERCENTAGE OF TAXPAYERS BY INCOME CATEGORY  
1979

	<u>Utah State</u>	<u>Davis County</u>	<u>Morgan County</u>	<u>Salt Lake County</u>	<u>Tooele County</u>	<u>Weber County</u>
Total Taxpayers	516,242	50,579	1,626	231,533	7,910	60,115
\$5,000 or less	24.5	22.1	18.6	23.9	21.0	23.3
\$5,001 - 10,000	19.2	17.8	17.8	19.3	16.3	18.8
\$10,001 - 15,000	14.7	13.5	12.4	14.9	14.2	14.7
\$15,001 - 20,000	13.1	13.3	15.2	11.5	15.6	14.1
\$20,001 - 25,000	10.9	12.3	14.2	10.8	13.5	11.2
\$25,001 - 30,000	7.4	8.9	9.7	7.3	8.9	7.7
\$30,001 - 50,000	8.5	10.8	10.7	8.8	9.8	9.0
\$50,001 - 100,000	1.4	1.3	12.9 <sup>1</sup>	1.8	0.6 <sup>1</sup>	1.1
Over \$100,000	0.3	0.2		0.4		0.2

Note.  
<sup>1</sup>Over \$50,000.

Source: Utah State Tax Commission, "Utah Statistics of Income, Individual Income Tax Returns, 1979 Return Year", May 1981.

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TABLE 43  
POVERTY STATUS OF UTAH POPULATION  
1980 Estimates

	<u>Population</u>	<u>Persons in Poverty</u>	
		<u>Rate</u>	<u>Number</u>
Utah State	1,461,037	8.0	166,479
Wasatch Front	941,172	6.6	61,695
Davis County	146,540	5.1	7,474
Morgan County	4,917	5.1	251
Salt Lake County	619,066	7.0	43,335
Tooele county	26,033	5.3	1,380
Weber County	144,616	6.4	9,255

Source: U. S. Department of Commerce, Bureau of Census, 1980 Census of Population and Housing; and Utah Department of Employment Security, Labor Market Information Services, Special Tabulation, 1981.

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### 3.4 Taxes

The two major sources of state revenue are sales and use taxes and income taxes. The former accounted for 38.9% of state revenues and the latter for 32.2% in the 1979-80 fiscal year (see Table 44). Like many other states, Utah's revenue collections have not been keeping up with projections. Receipts in 1980 for the major funds were \$31 million below the estimates made in 1979.

TABLE 44  
UTAH STATE TAX REVENUES FY 1979-1980  
(\$ Millions)

	<u>Actual FY 79-80</u>	<u>% of Fund Total</u>	<u>% of All Revenue</u>
<u>General Fund</u>			
Sales and Use Tax	320.5	79.7	38.9
Liquor Profits	15.0	3.7	1.8
Insurance Premiums	14.7	3.7	1.8
Beer, cigarettes, Tobacco	12.4	3.1	1.5
Interest Income	19.1	4.8	2.3
Mine Occupations	9.8	2.4	1.2
Inheritance	1.7	0.4	0.2
Other Licenses	8.9	2.2	1.1
Total	<u>402.1</u>	<u>100.0</u>	<u>48.8</u>
<u>Uniform School Fund</u>			
Individual Income Tax	265.3	79.7	32.2
Corporate Franchise Tax	40.4	12.1	4.9
School Land Income	10.7	3.2	1.3
Interest on Revenue Sharing	0.0	0.0	0.0
Excess Property Tax	1.8	0.5	0.2
Federal Revenue Sharing	14.0	4.2	1.7
Other	0.5	0.2	0.06
Total	<u>332.7</u>	<u>100.0</u>	<u>40.4</u>
<u>Transportation Fund</u>			
Motor Fuel Tax	60.5	68.0	7.3
Special Fuel Tax	10.5	11.8	1.3
Motor Vehicle Registration	10.4	11.7	1.3
Other truck Registration	6.3	7.1	0.8
Drivers Licenses	2.0	2.2	0.2
Interest	0.0	0.0	0.0
Total	<u>89.0</u>	<u>100.0</u>	<u>10.8</u>
Total Funds	824.5		

Source: Utah State Tax Commission, "Twenty-sixth Biennial Report of the Utah State Tax Commission", July 1980-June 1981; "Twenty-fifth Biennial Report of the Utah State Tax Commission", July 1979-June 1980; "Twenty-fourth Biennial Report of the Utah State Tax Commission", July 1978-June 1979.

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State sales taxes are set at 4.0% of purchase price and remitted to the general fund. There is also a local optional sales tax of up to 0.75%, which goes back to the city or county imposing the tax. Also, an additional 0.25% can be levied for a transit district--currently Salt Lake, Davis, and Weber counties have such a levy.

Individual and corporate income taxes are collected by the state for distribution to the Uniform School Fund, which is distributed to local school districts for minimum school support.

The property tax is allocated to school districts, municipalities, counties, and special districts. Although public utility property is assessed at the state level, all other property is assessed at the local level. Current assessments are to be based on 25% of reasonable and fair cash value for real and personal property. This is not necessarily market value, however, and the ratio actually seems to range between 5% and 20% of market value. The State Tax Commission is striving for an assessment ratio of about 20% of market value.

Property taxes are the major source of revenue for units of local government, amounting to over 30% of general fund revenues. State aid is responsible for another 37% of general revenue.

Assessed valuations (shown in Table 45) grew by nearly 185% between 1970 and 1980 in the Wasatch Front region, which was slightly slower than the state as a whole but still represents as strong performance. In Tooele County growth during this 10-year period was 161.3% with the largest gains in mining related activities and recently in residential structures.

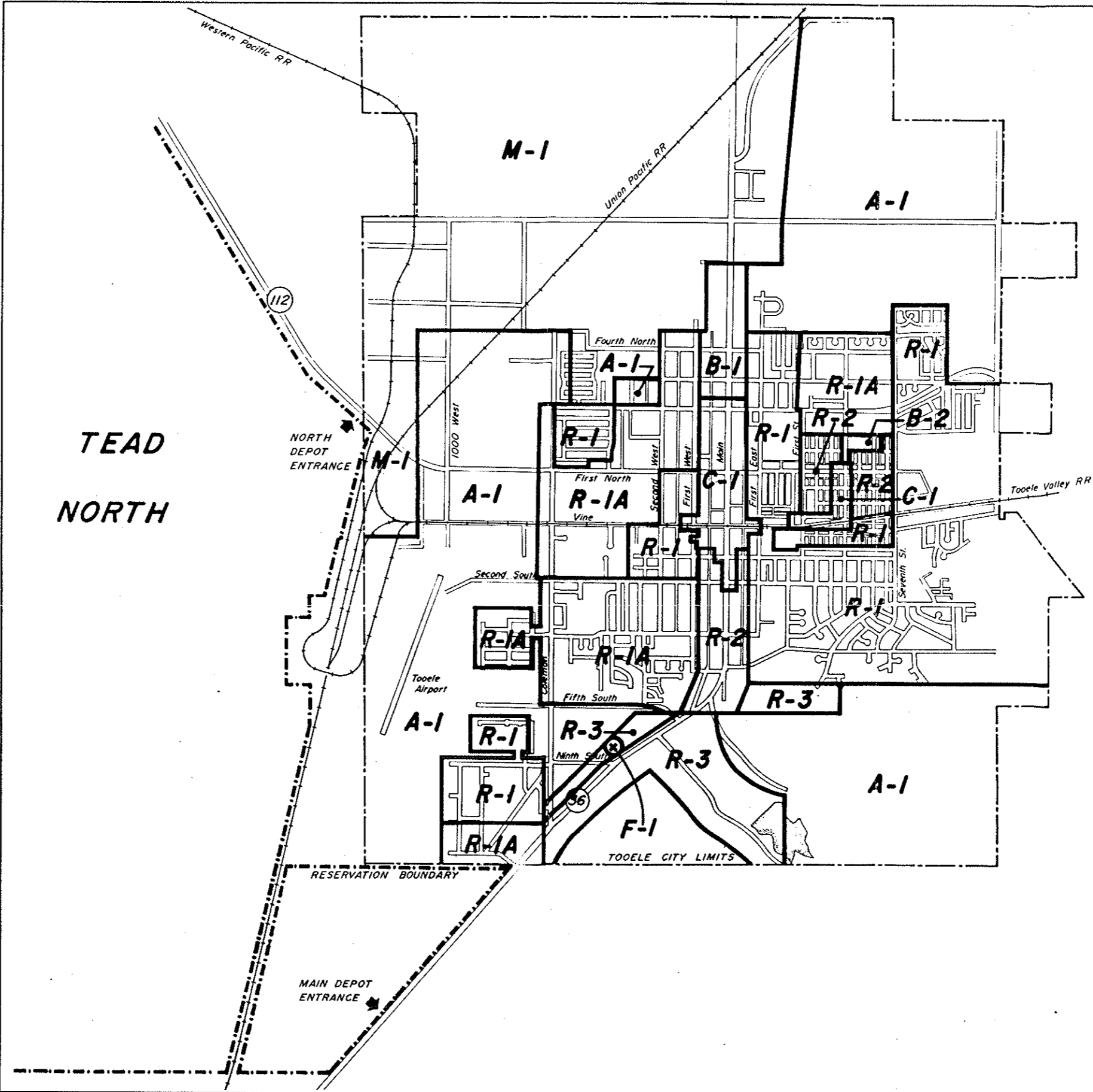
Property taxes are levied by cities, counties, school districts, and a variety of special districts for public improvements. Table 46 shows the distribution of the property taxes collected during 1980. Table 47 summarizes the millage rates for 1981 collections for the Wasatch Front counties and the primary cities in these counties. The total levy depends on the number of special districts which overlap in various jurisdictions. The levels in Table 47 assume specific special levies and are only an example of millage rates in the areas.

TABLE 45  
ASSESSED VALUATIONS  
1979-80  
(\$000)

	<u>1970</u>	<u>1980</u>	<u>% Change</u>
Utah State	1,847,510	5,602,369	203.2
Wasatch Front	1,221,208	3,478,458	184.8
Davis County	105,345	341,544	224.2
Morgan County	10,204	15,548	52.4
Salt Lake County	927,683	2,701,363	191.2
Tooele County	29,204	76,314	161.3
Weber County	148,772	343,689	131.0

Source: Utah Foundation, "Statistical Review of Government in Utah," 1981 edition.

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## LEGEND

### RESIDENTIAL

- R-1 1-4 Family Dwellings
- R-1A same as R-1, but allows keeping some animals and fowl
- R-2 Multiple Dwellings
- R-2A same as R-2, but allows keeping some animals and fowl
- R-3 Low Density Apartments

### AGRICULTURAL

A-1

### BUSINESS

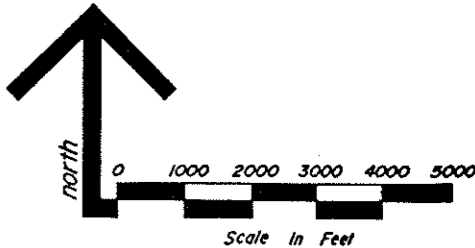
- B-1 Business District
- B-2 Business District

### COMMERCIAL

C-1 Commercial District

### MANUFACTURING

M-1 Manufacturing District



**TOOELE CITY  
EXISTING ZONING**

TABLE 46  
DISTRIBUTION OF PROPERTY TAXES  
1980  
(\$000)

	<u>Davis County</u>	<u>Morgan County</u>	<u>Salt Lake County</u>	<u>Tooele County</u>	<u>Weber County</u>
School Districts	14,225	682	103,903	3,120	14,432
Cities and Towns	3,957	35	19,238	902	4,430
County	4,457	237	43,222	954	7,028
Special Districts	2,467	24	23,882	66	1,967
Livestock Taxes	1	1	2	8	2
Total	25,107	979	190,256	5,050	14.0
% Change (79-80)	4.9	8.9	9.9	14.0	13.9

Source: Utah Foundation, "Statistical Review of Government in Utan," 1981 edition.

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TABLE 47  
MILLAGE LEVIES IN WASATCH FRONT COUNTIES  
1981  
(mills)

	<u>City</u>	<u>County</u>	<u>School Districts</u>	<u>Library</u>	<u>Special Districts</u>	<u>Total</u>
<u>Davis County</u>						
Unincorporated Areas	NA	13.56	43.34	1.85	1.25	60.00
Bountiful City	10.37	13.56	43.34	1.85	1.25	70.37
<u>Morgan County</u>						
Unincorporated Areas	NA	11.06	33.72	NA	0.80	45.58
Morgan City	6.83	11.06	33.72	NA	0.80	52.41
<u>Salt Lake County</u>						
Unincorporated Areas <sup>1</sup>	NA	17.79	45.15	2.88	8.46	74.28
Salt Lake City	15.79	17.79	40.18	3.00	2.00	78.76
<u>Tooele County</u>						
Unincorporated Areas	NA	11.49	38.36	NA	NA	49.85
Tooele City	25.16	11.49	38.36	NA	NA	75.01
<u>Weber County</u>						
Unincorporated Areas	NA	15.72	34.74	NA	1.42	51.88
Odgen City	16.69	15.72	39.34	NA	3.07	74.82

Note:

<sup>1</sup>For areas in Granite School District.

Source: Utah Taxpayers Association, "State of Utah 1981 Property Tax Review," December 1981.

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Tooele City has one of the highest property tax rates in the Wasatch Front Region at 75.01 mills, surpassed only by Salt Lake City. The gap between Tooele City and unincorporated areas in Tooele County (25.16 mills) is unusually large.

Sales and use tax distributions increased in the neighborhood of 10% between 1979 and 1980 in most Wasatch Front counties. Tooele County, however, experience a 1.9% increase with a 12.9% decline inside the cities and a 90% gain outside the cities. While cities still receive the majority of retail sales receipts, the trend favors unincorporated areas. Table 48 shows gross taxable sales and sales taxes for Tooele County in FY 1980.

TABLE 48  
LOCAL OPTION SALES TAX COLLECTIONS  
FY 1980

<u>Tooele County</u>	<u>Gross Taxable Sales</u>	<u>Net Local Sales Taxes</u>
Grantsville	\$ 5,887,401	\$ 43,272
Stockton	324,571	2,386
Tooele	59,559,081	437,759
Vernon	147,681	1,085
Wendover	4,780,551	35,137
Unincorporated Areas	<u>19,501,392</u>	<u>143,335</u>
Total County	\$ 90,200,677	\$ 662,975

Source: Utah Foundation, "Statistical Review of Government in Utah," 1981 edition.

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#### 4. Land Use

##### 4.1 North Area

TEAD North is located in Tooele Valley, which is bounded by the Great Salt Lake on the north, the Oquirrh Mountains on the east, South Mountain on the south, and the Stansbury Mountains on the west. With the exception of Grantsville, Tooele City, Stockton, and occasional residential development north of Tooele City, Tooele Valley is predominantly undeveloped. Grazing limited cultivation predominate. Grantsville is located approximately two miles north of the northwest corner of TEAD-N; Tooele City lies adjacent to the northeast corner; and Stockton is located approximately three miles to the south along SR 36.

With the exception of Tooele City, the properties immediately adjacent to the TEAD-N boundaries are undeveloped. The properties to the north are used as pasture or cultivated, and the properties to the west and south are used for rangeland grazing. The properties to the east of TEAD-N consist of the City of Tooele and undeveloped rangeland along the lower western slopes of the Oquirrh Mountains. Scattered gravel pits are also located southeast of TEAD-N along SR 36. With the exception of the southeastern portion (bounded by SR 36), TEAD-N is bounded on the east by Union Pacific Railroad right of way.

Residential development within the Tooele city boundaries abuts are the northern boundary of this portion of TEAD-N. The Tooele Municipal Airport and some scattered residential uses are located along the eastern boundary north to SR 112. SR 112 forms the northeastern boundary of TEAD-N. The area northeast of SR 112 is presently undeveloped.

TEAD-N is located in Tooele County. Land use guidelines for Tooele County are provided in "A Master Plan for Tooele County" (1972) and the Tooele County Zoning Ordinance and Map (October, 1981).

The master plan map designates the area surrounding TEAD North as MU-40, or Multiple Use with one family per 40+ acres (with the exception of the area included within the corporate limits of Tooele City). The county zoning map designates the area south and west of TEAD-N as Mu-40; the area to the north as A-20, RR-10, and M-D; and the unincorporated area to the east as RR-5 and M-D. (See the zoning map on the following page.)

The MU-40 or Multiple Use District is intended as a low-density zone with limited human habitation and public utility and service requirements. The primary uses are agricultural and open space. The minimum parcel size per dwelling unit is 40 acres.

The A-20 or Agricultural District is intended to promote and preserve conditions favorable to agriculture in appropriate areas and to maintain greenbelt open spaces. The minimum parcel size for dwelling units within this district is 20 acres.

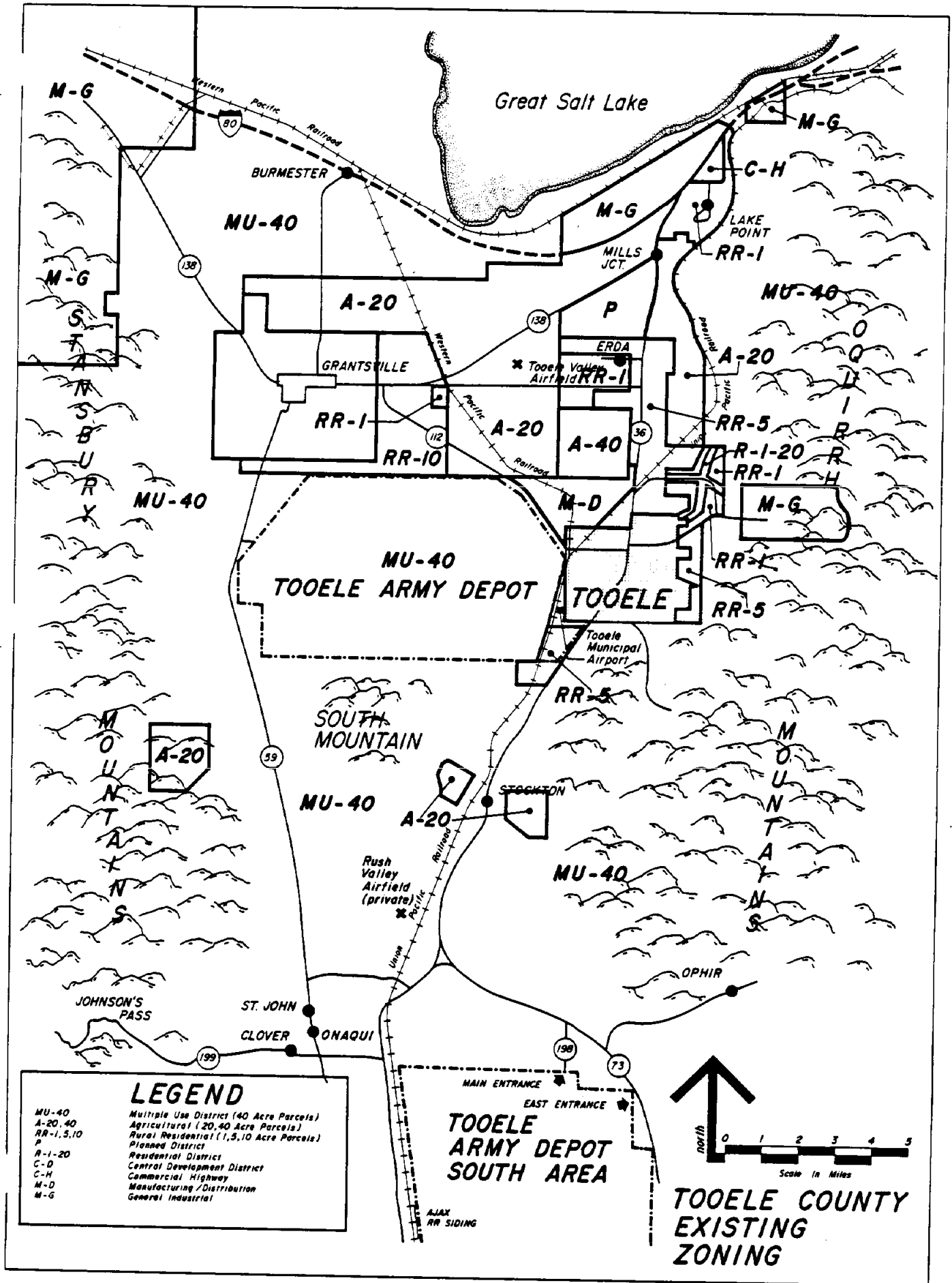
The RR-10 or Rural Residential District is intended to promote and preserve conditions favorable to large-lot family life, the keeping of limited numbers of animals and fowl, and reduced requirements for public utilities. The minimum lot size per dwelling unit is 10 acres. The RR-5 District has the same intent as the RR-10 District but the minimum allowable lot size is five acres.

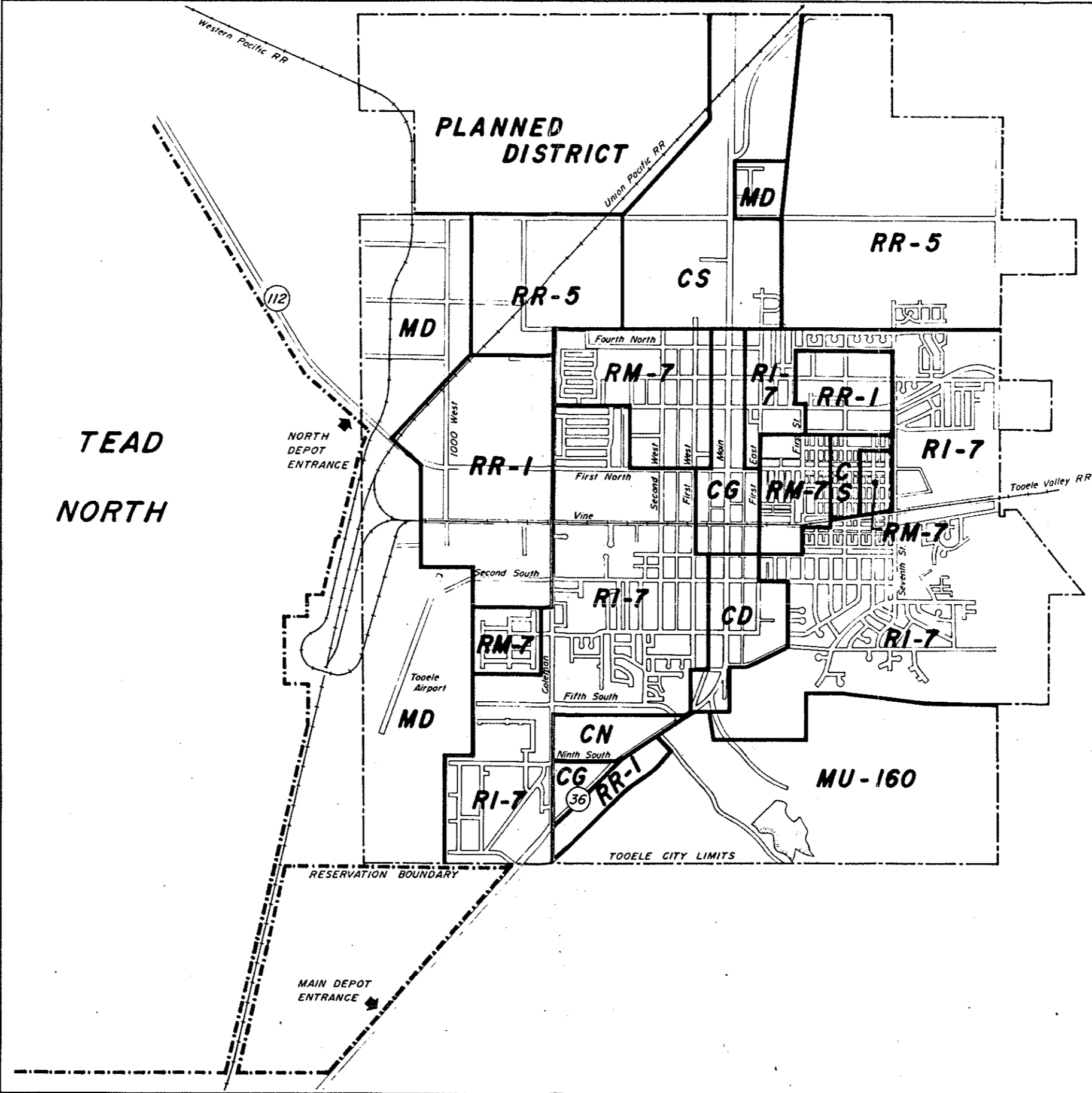
The M-D or Manufacturing-Distribution District is intended to provide areas for light manufacturing, industrial processes, and warehousing that do not produce objectionable effects.

The zoning ordinance requires a building permit, an occupancy permit, and site plans prior to new construction within the county. These requirements provide for review by the county to ensure public safety and welfare.

Land use within the City of Tooele is controlled by the Uniform Zoning Title of Tooele City. The city has no adopted comprehensive plan. The zoning code and zoning map are presently in the process of revision and are expected to be adopted in early 1982. The zoning code and map establish various zoning districts and define allowable uses and standards for each district.

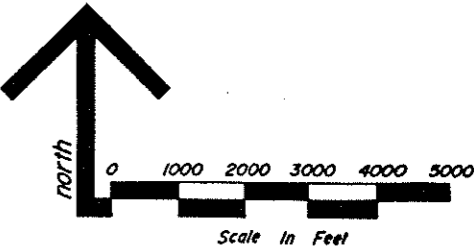
The existing zoning map (December, 1977) for the city designates the area bounding the northeast portion of TEAD North as A-1 or Agricultural District and M-1 or Manufacturing District. The extreme northeast corner is bounded on the north by an R-1A or Residential District. (See the zoning map on page 97.) The A-1 districts allow single-family development on minimum lot sizes of 6,000 square feet for sewered areas and 12,000 square feet for non-sewered





**LEGEND**

- RESIDENTIAL**
- RR-1 Rural Residential (1 Acre Parcels)
  - RR-5 Rural Residential (5 Acre Parcels)
  - RI-7 Residential (7,000sq.ft. Lots)
  - RM-7 Residential (varied housing styles, 7 units per acre)
- MULTIPLE USE DISTRICT**
- MU-160 (160 Acre Parcels)
- COMMERCIAL**
- CN Neighborhood Commercial
  - CG General Commercial
  - CS Commercial Shopping
- MANUFACTURING / DISTRIBUTION**
- MD
- CENTRAL DEVELOPMENT**
- CD



**TOOELE CITY  
PROPOSED ZONING**

areas. Animal keeping is allowed. The M-1 district allows any use allowed in the A-1 district but is intended primarily for manufacturing-related uses.

The proposed zoning map (see page 101) designates the entire area (within the city limits) bordering the eastern portion of TEAD North as M-1. This includes the site of the present Tooele Municipal Airport. The residential area adjacent to the north side of the extreme northwest corner of TEAD-N will be rezoned as R1-7. This zone is intended to provide areas for medium low-density, single-family residential neighborhoods with minimum lot sizes of 7,000 square feet.

#### 4.2 South Area

TEAD South is located in Rush Valley approximately 15 miles due south of the main Depot complex at TEAD North. The area between TEAD-N and TEAD-S is sparsely populated and consists of cultivated land along the valley floor west of SR 36, rangeland grazing, scatter ranches, and the community of Stockton. The communities of St. John, Onaqui, and Clover are located approximately two miles northwest of the Depot. Faust is located approximately five miles south and Ophir is located approximately four miles northeast of the Depot. The ghost town of Mercur is roughly three and one-half miles to the east. The Mercur area has recently been purchased by Getty Oil and is planned for minerals extraction and processing facility. Aside from these residential communities, the area surrounding the TEAD South facility is undeveloped and used for rangeland grazing. A ranch located within a mile of the northeast corner of the Depot is the nearest site of human habitation off the facility. A Union Pacific right of way forms the western boundary of the Depot and has a siding or interchange yard (Clover siding) along the northern half of the boundary.

The land uses surrounding TEAD-S offer no present threat of encroachment to the Depot. It does not appear that future encroachment is likely since the communities of Onaqui and Clover are not expected to experience any significant growth in the future.

TEAD-S, like TEAD-N, is located in Tooele County. The entire area surrounding TEAD South is zoned MU-40. This zone essentially extends all the way to TEAD North. The main exceptions to this MU-40 zone are two areas zoned A-20 immediately southwest and southeast of Stockton.

### 5. Transportation

#### 5.1 Road Network

Interstate 80 is the primary highway providing access to the Tooele area, as shown on the map on page 103. I-80 links Salt Lake City with Wyoming to the east and Nevada to the west and is part of the national interstate system. I-80 also links with I-15, a major north/south highway, in Salt Lake City. Tooele City and the Tooele Army Depot are lined to I-80 via SR 36.

SR 36 is the main north/south highway in Tooele County, running through Tooele City from I-80 south to the Tooele County line. SR 36, which is a Federal-aid Primary highway, links with U.S. Route 6/50 approximately 57 miles south of Tooele City. The main gate of TEAD North is accessed via SR 36, which also forms a portion of the Depot's eastern boundary. SR 36 also provides linkage with TEAD South; access to the South Area main gate is provided via SR 73, which intersects SR 36 approximately three miles to the north.

SR 73 is a Federal-aid Secondary highway which runs southeast to the Tooele/Utah county line.<sup>71</sup> SR 72 intersects with Interstate 15 at Lehi, approximately 25 miles south of Salt Lake City.

SR 112 is a Federal-aid Secondary highway which links Tooele City and Grantsville.<sup>72</sup> The north and northwest gates of TEAD North are accessed via SR 112.

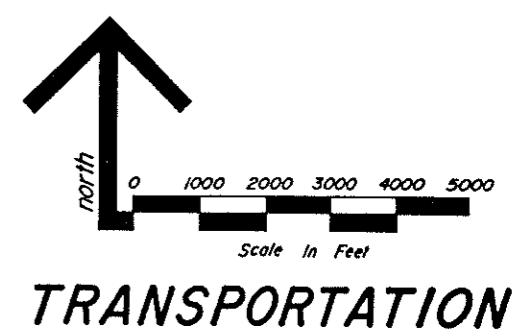
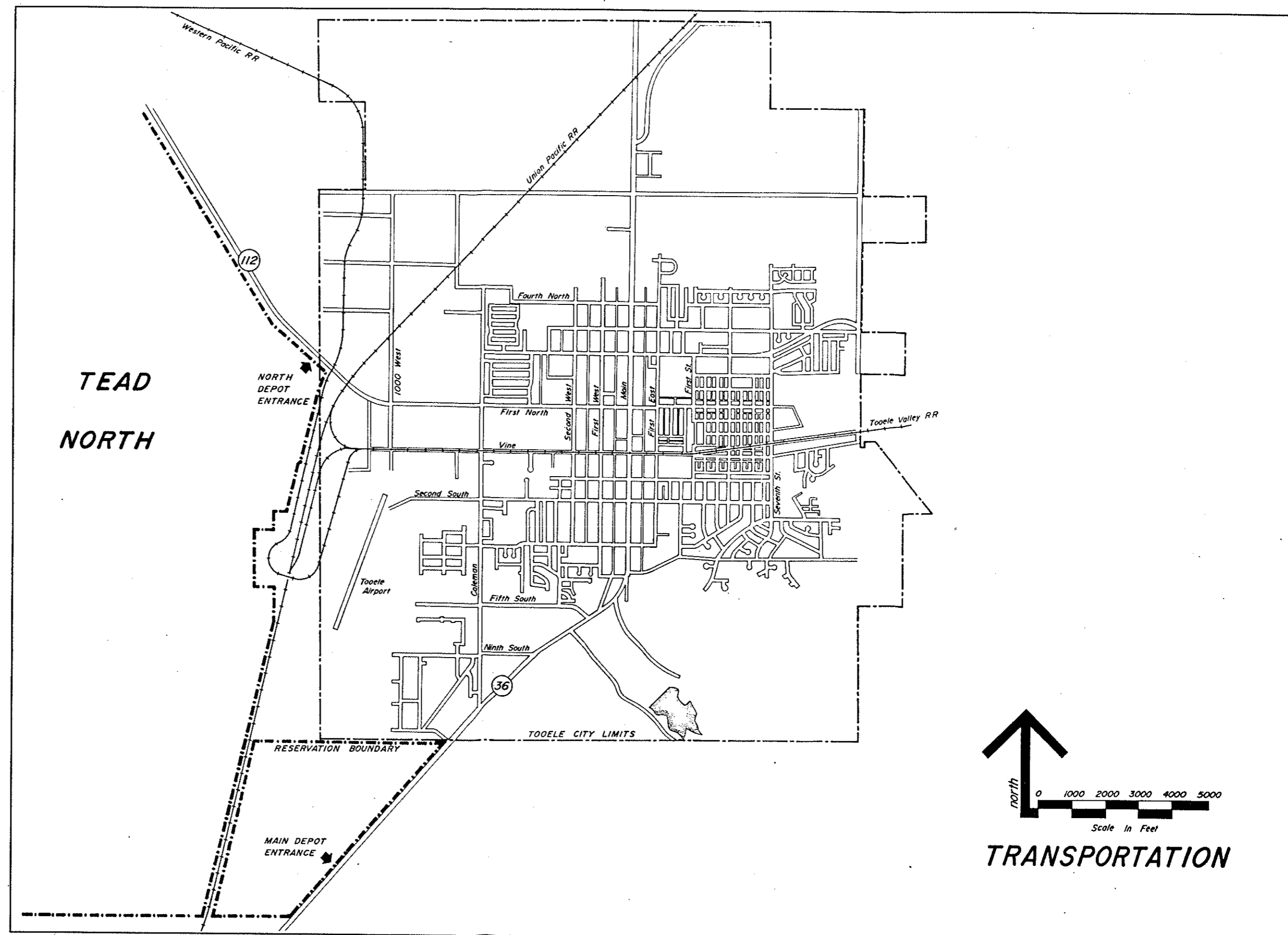
SR 138 (old U.S. Route 40/Alternate 50) which links Grantsville and SR 36, is a Federal-aid Secondary highway.<sup>73</sup> SR 138 forms a loop which links with I-80 west and east of Grantsville.

In addition, Highway 59, a state collector road, links Grantsville and SR 199 at Clover. Highway 59 passes along the western boundary of TEAD North. SR 199 provides a link between TEAD North and South to Dugway Center. CR-45, a gravel-surface road, also links Dugway and TEAD South.

Traffic counts for the local highway system are shown in Table 49. The average daily traffic (1981) is well within the capacities of the respective route segments. The major concentration of traffic is within Tooele City. Although no problems with overall traffic volumes are evident, there are reported congestion problems within Tooele City during the morning and afternoon peak periods. The major problems result from east/west traffic attempting to cross Main Street (SR 36) (see the map on page 107). The primary problem intersections (particularly during the afternoon rush period) are 1st and 2nd North Avenues and 1st South Avenue.<sup>74</sup> Truck traffic was also noted as a problem in terms of both congestion and accidents.<sup>75</sup>

Table 50 shows accident locations and types for selected route segments in the local vicinity. According to the Utah Department of Transportation (DOT), there are not notable problem areas over this route network with respect to vehicular accidents.<sup>76</sup> Countywide accident rates are low; the average over the last three years have been 1.45 vehicular accidents per million vehicle miles (MVM). The three-year average for the City of Tooele is 7.99 accidents per mvm which is about average for a city the size of Tooele.

There were 438 investigated vehicular accidents in 1980 and 456 in 1981 within the City of Tooele.<sup>77</sup> The intersection of 1st and 2nd North Avenues with Main Street are the primary problem intersections. Accidents at these intersections result from conflicts with cross-street traffic--primarily left-turn rear-end accidents during the morning and afternoon peak traffic periods. The 1st North Avenue intersection with Main Street was also cited as a difficult intersection for large trucks. The Police Department has recently assigned one officer in a selective traffic program to identify problems and enforce violations which may result in these intersection accidents.



TRANSPORTATION

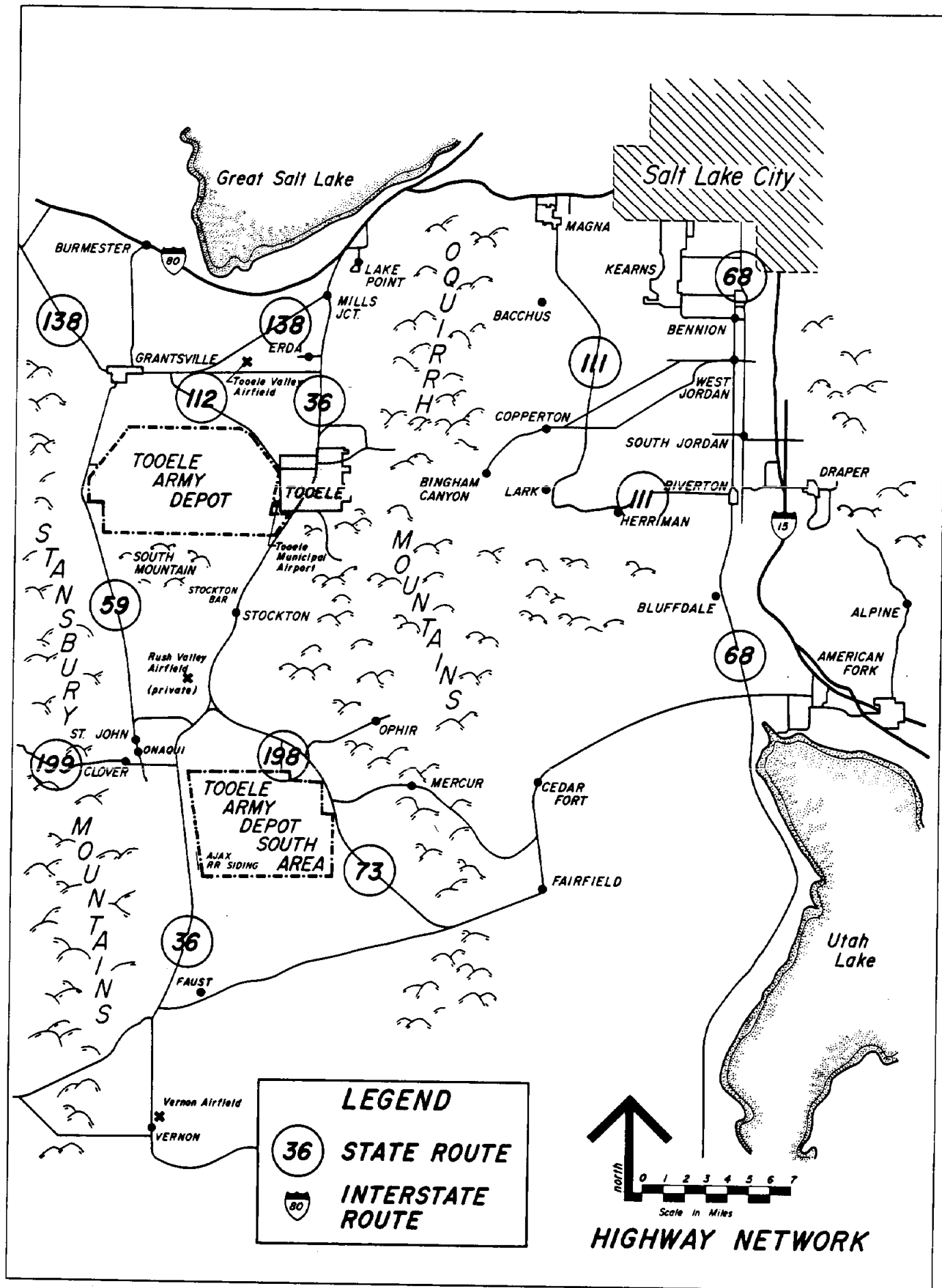


TABLE 49  
CAPACITIES AND TRAFFIC VOLUMES ON  
MAJOR HIGHWAYS IN NORTHEAST TOOELE COUNTY

<u>Highway Segment</u>	<u>Capacity, ADT (Service Level E)</u>	<u>ADT 1970</u>	<u>ADT 1980</u>
<u>SR 73</u>			
Junction SR 36 to TEAD South Gate	12,020	--	740
TEAD South Gate to Tooele County Line	12,020	--	410
<u>SR 36</u>			
Junction SR 73 to Stockton	12,020	--	2,000
Stockton to Main Gate TEAD	12,020	1,850	2,600
South Limit Tooele City	12,020	2,100	5,385
4th South Street in Tooele City	12,020	4,650	13,570
Vine Street in Tooele City	22,700	9,100	13,570
0.8 mile north of Vine Street	22,700	11,800	13,570
North Limit Tooele City	22,700	5,155	6,110
Mills Junction	14,710	4,225	6,110
Lake Point	14,710	7,985	8,980
<u>SR 112</u>			
East Limit Grantsville, to West Limit Tooele City	12,670	1,575	2,100
Point 0.6 mile west of SR 36 (Warner Station)	10,620	4,060	5,300
<u>SR 138</u>			
East Limit Grantsville to Mills Junction	13,630	4,540	--
Junction with SR 112	13,630	--	2,900
Junction with SR 36	13,630	00	1,430

Source: Capacities and 1970 ADT: Tooele County, "Tooele County Transportation Study, Vol. II," July, 1971; 1981 ADT: Utah Department of Transportation, telephone interview, February, 1982.

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The Utah DOT has recently completed several resurfacing projects in the area but has no additional major projects either funded or proposed. Current local highway capacities and conditions are considered to be adequate to accommodate traffic flows. The City of Tooele and Tooele County have discussed the need for an SR 36 by-pass west of Tooele City. Tooele County indicates that a 200-foot right of way to accommodate a principal arterial by-pass should be provided for.<sup>78</sup> This by-pass would begin at a point south of the TEAD North main gate and proceed along the western portion of Tooele City to a point north of the city, providing a link with SR 36. The purpose of this by-pass would be to relieve Main Street (SR 36) of commuter and truck traffic.

TABLE 50  
TRAFFIC ACCIDENTS ON HIGHWAYS IN NORTHEAST TOOELE COUNTY

Route Segment	Total	Severity			Vehicle Type				Vehicles Involved				ADT	
		Prop. Dam.	Inj.	Fatal	Auto	Van/ Pick-up	Heavy Truck		Other	Involved				
							Truck			1	2	3		4
SR 36														
SR 73 xn to Stockton south C.L	12	5	7	0	9	5	1	0	9	3	0	0	1,260	
Stockton within C.L.	8	5	3	0	11	4	1	0	1	6	1	0	2,160	
Stockton north C.L. to Tooele City South C.L.	10	7	3	0	9	2	0	0	9	1	0	0	2,240	
Tooele City South C.L. to SR 112 xn (1st North)	27	21	6	0	31	11	0	3	6	21	0	0	12,250	
xn with 1st North	6	--	6	0	11	1	0	0	0	6	0	0	16,600	
2nd North xn	4	3	1	0	5	2	1	0	0	4	0	0	7,100	
2nd North to Tooele C.L	7	3	4	0	10	2	0	1	1	6	0	0	7,100	
Tooele City N. C.L. to Tooele City West C.L.														
Mills Jct (xn w/SR 138)	46	27	19	0	49	19	5	0	21	21	2	1	5,800	
Mills Jct. to I-80 on ramp	14	5	9	0	14	5	0	1	8	6	0	0	11,600	
SR 73														
SR 36 xn to County line	5	2	3	0	4	1	0	0	5	0	0	0	380	
SR 112														
Grantsville East C.L. to Tooele City West C.L.	9	4	5	0	11	3	0	0	4	5	0	0	1,960	
Tooele City West C.L. to xn SR 36	7	5	2	0	7	4	1	0	2	5	0	0	5,300	
SR 138														
Grantsville East C.L. to xn SR 36	4	1	3	0	4	0	1	0	3	1	0	0	1,670	

Key: xn - intersection; C.L. - city limits; ADT = average daily traffic.

Source: Utah Department of Transportation, February, 1982.

## 5.2 Trucking

There are two trucking companies based in Tooele City. Consolidated Distributing Company is licensed in 11 western states as a common carrier, including the State of Utah. Consolidated hauls on demand and is authorized to haul (1) general commodities of 100 pounds or less; (2) contract concrete, clay, and petroleum products; and (3) government commodities except munitions, household goods, and secret materials.<sup>79</sup> McFarland and Hullinger hauls construction materials, ore, sand, and gravel under contract.

Several other trucking companies operating out of the Salt Lake City area provide daily scheduled services to Tooele City and TEAD, including Motor Cargo; Consolidated Freightways; Wycoff Company, Inc.; Garrett Services, Inc. Irregular service is provided on demand to both Tooele City and TEAD by Yellow Freight; Ashworth Transfer, Inc.; and Harry L. Young and Sons. Ashworth Transfer, Inc. and Harry L. Young specialize in heavy equipment and machinery hauling. The other trucking companies mentioned above haul general commodities. Several of these companies are authorized to haul munitions and classified government commodities.

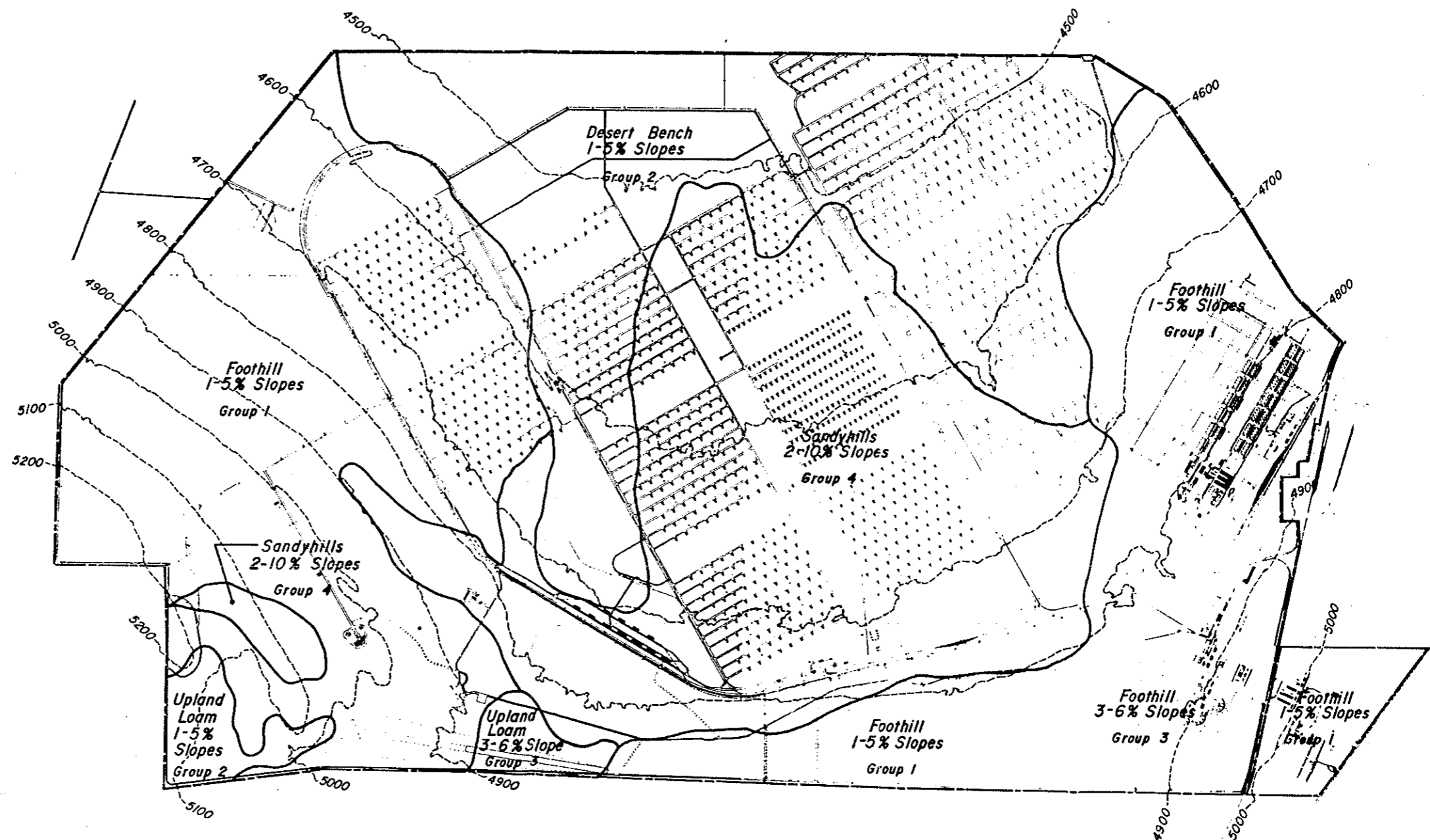
IML Freight, Inc. hauls to Tooele but does not provide service to Tooele City while Illinois-California Express, Inc. (ICX) hauls only to Tooele City. ICX ties in with other carriers for TEAD commodities and hauls only full truckloads into Tooele City on a demand basis.

Several trucking companies operate out of the Salt Lake City area in providing interstate and intrastate service, but do not haul into either Tooele City or TEAD. Included among these are Browning Freight Lines; Milne Truck Lines, Inc.; Ringsby United; and Rio Grande Motor Way, Inc.<sup>80</sup>

## 5.3 Rail Transportation

Rail service for commodity haul only (no passenger service) is provided to Tooele City and TEAD North by the Union Pacific and Western Pacific railroads. Links with Southern Pacific and the Denver and Rio Grande Western railroads are made in Salt Lake City. Both Western Pacific and Union Pacific interchange with the Denver and Rio Grande Western Railroad as well as each other in Salt Lake City. Union Pacific interchanges with Southern Pacific in Ogden. The Tooele Valley Railroad which formerly served the mines east of Tooele City is no longer in use.

The Union Pacific Railroad hauls bulk commodities on a full-carload basis. Less than carload service has been discontinued. The UP line, westward from Salt Lake City, is routed in a southerly direction at Lake Point Junction and extends through Tooele City and the eastern portion of Tooele County to its western terminus in Los Angeles. The UP also interchanges with the Western Pacific line at Garfield, which is near Lake Point Junction. Service through Tooele County is provided seven days a week. Carload commodities for Tooele City or TEAD North are eight off/on-loaded or transferred at the Warner Station. This station is staffed by the UP on a mobile basis as demand warrants. The Union Pacific line parallels the western boundary of TEAD South with a siding at Clover. A branch line extends into TEAD South at the Clover siding.



SOILS / TOPOGRAPHY

Western Pacific Railroad operates over a main line which serves the northern portion of Tooele County. The line is routed westward from Salt Lake City to its western terminus in San Francisco. A branch line extends southward from the station at Burmester to Tooele City and TEAD North. The Burmester Station is staffed during the day, six days per week. Full carload service to Tooele City and TEAD North is provided three days per week. Less than carload service is provided by the Western Pacific Transportation Company in the form of truckload rail piggyback service. In addition to Tooele City and TEAD North, Western Pacific also provides bulk haul service to the various mining, manufacturing, and extractive industries in Tooele Valley.<sup>81</sup>

The nearest passenger rail service to the Tooele area is provided by AMTRAK with a depot located in Salt Lake City. Daily departures are provided out of the Salt Lake City depot to interstate points north, south, east, and west.

#### 5.4 Air Transportation

There are several airports serving Tooele County. However, the nearest scheduled commercial air passenger and cargo services are provided at Salt Lake City International. Table 51 lists the existing airports that are included in the Wasatch Front Metropolitan Airports System Plan. Two private landing fields (Rush Valley and Low Flight Strip) are also located in Tooele County.<sup>82</sup>

Tooele Valley Airport, located about nine miles northwest of Tooele City, consists of a single paved runway 5,500 feet long and 75 feet wide. The airport is presently unattended.<sup>83</sup> Under the selected alternative of the Metropolitan Airports System Plan, Tooele Valley Airport is designated as a general utility airport to serve as a general aviation and local training airport for the Salt Lake City metropolitan area. Present recommendations call for a new parallel runway which would accommodate jet traffic and a basing capacity of 500 aircraft.<sup>84</sup>

Tooele Municipal Airport is located in the Southwestern portion of the City of Tooele. Tooele Municipal has a single paved runway that is 4,200 feet in length and 40 feet wide. As with Tooele Valley Airport, it is presented unattended.<sup>85</sup> The Tooele Municipal site is presently under trade negotiation between the city and a provide developer for use as an industrial site. It may eventually be phased out.

Salt Lake City International Airport is located approximately 30 miles east of the City of Tooele. Salt Lake City International has a main runway length of 12,000 feet and is a major jet airport linking Salt Lake City with other U.S. cities. Eleven major airlines and eight local or regional airlines currently serve Salt Lake City. The passenger airlines serving Salt Lake City International include American, Continental, Delta, Eastern, Frontier, Republic, Texas International, TWA, United, Western, Air Alaska, PSA, Air Chaparral, Bridger Air, Cascade, Scenic, Skywest, and Transwestern of Utah.

TABLE 51  
EXISTING AIRPORTS

<u>Airport</u>	<u>Owner- ship</u>	<u>Acres</u>	<u>Runway</u>	<u>Principal Use Runway Orien- tation</u>	<u>Length (feet)</u>	<u>Total Aircraft<sup>2</sup></u>
<u>Davis County</u>						
Hill Air Force Base	USG	—	14-32	NW/SE	13,500	n.a. <sup>3</sup>
H&H	P	—	—	—	—	—
Skypark	P	175	16-34	N/S	4,700	138
<u>Morgan County</u>						
Morgan Municipal	M	28	3-21	NE/SW	3,800	14
<u>Salt Lake County</u>						
Camp Williams	P	—	—	—	—	—
Salt Lake City Inter.	M	2,787	16-34	N/S	12,000	503
Salt Lake City No. 2	M	1,132	16-34	N/S	5,604	109
<u>Tooele County</u>						
Michael Army Air Field	USG	—	12-30	NW/SE	13,100	0
Tooele Municipal	M	96	18-36	N/S	4,200	5
Tooele Valley	M	120	16-34	N/S	5,500	8
Vernon Municipal	M	40	18-36	N/S	3,062	1
Wendover	M	196	3-21	NE/SW	9,100	9
<u>Utah County</u>						
Cedar Valley	P	—	—	—	3,800	—
Lehi	P	65	16-34	N/S	3,250	3
Provo Municipal	M	1,000	13-34	NW/SE	7,092	247
Saratoga Resort <sup>4</sup>	P	—	—	N/S	1,200	1
Spanish Fork- Springville	M	288	12-30	NW/SE	3,500	35
<u>Wasatch County</u>						
Heber Valley	M	127	3-21	NE/SW	4,400	22
<u>Weber County</u>						
Ogden Municipal	M	691	3-21	NE/SW	7,300	237
<u>Box Elder County<sup>5</sup></u>						
Brigham City <sup>5</sup>	M	254	16-34	N/S	5,500	37

Notes:

<sup>1</sup>M = municipal/public ownership; P - private ownership; USG - U.S. Government ownership.

<sup>2</sup>Includes only general aviation based aircraft.

<sup>3</sup>Not available.

<sup>4</sup>Closed to the public.

<sup>5</sup>Although Brigham City Airport in Box Elder County is outside the Wasatch Front Mountainlands Region, its proximity to the populated areas of Weber County requires that it be considered as part of the Metropolitan Airports System Plan.

Source: Wasatch Front Regional Council and Mountainlands Association of Governments Metropolitan Airports System Plan; 1979 FAA Airport Master Records; and field inventory.

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Military airports which provide occasional support services to TEAD include Hill Air Force Base (13,500-foot runway length) and Michael Army Air Field at the Dugway Proving Ground (13,000-foot runway length). Both airfields are capable of accepting C-5A and C-141 jet cargo aircraft. Hill AFB and Michael AAF are located approximately 60 miles northeast and 42 miles southwest of TEAD North, respectively. Military material is shipped through Hill AFB, and Michael AAF has been used for the shipment of chemical munitions.

## 5.5 Public Transportation

Transit service in the Wasatch Front region is provided by the Utah Transit Authority (UTA). Transit service is presently provided within the urbanized portions of Salt Lake, Davis, and Weber counties, which include the Salt Lake City and Ogden area.<sup>87</sup> UTA has recently discontinued bus transit service between Tooele City and Salt Lake City in favor of a self-supporting van pool system. Both the van and driver are provided by UTA. The 19-passenger van presently runs from Salt Lake City to Tooele City in the morning and returns in the afternoon. Currently there are no plans for expanded service.

Interstate bus service in the area is provided by both Continental Trailways and Greyhound to Grantsville. No direct service is provided to Tooele City. Grantsville is a pick-up point along the route between Salt Lake City and San Francisco. Greyhound provides twice-daily service from and returning to Salt Lake City and stop between the major destination.<sup>88</sup> Continental Trailways provides one daily trip from Salt Lake City to Grantsville and points west. The return stop at Grantsville for the eastbound run to Salt Lake City is on demand only and is not regularly schedule.<sup>89</sup>

Taxi service in Tooele County is provided by Green Top Cab located in Tooele City. Green Top operates three cabs and provides taxi service between the hours of 7:00 a.m. and 10:00 p.m.<sup>90</sup> Green top provides taxi service to TEAD and, on occasion, to Salt Lake City.

## 6. Energy Use

Utah Power and Light Company (UP&L) is an energy corporation providing service to customers in Utah, southeastern Idaho, and southwestern Wyoming. The population of the company's service area is estimated at 1,800,000. This area comprises some 86,000 square miles, extending from Ashton, Idaho to the Utah/Arizona border. The company also sells energy at retail rates to more than 400 cities and towns and at wholesale rates to municipal customers.<sup>91</sup>

Utah Public Service commission customers provided the bulk of UP&L's revenues (approximately 67%) in 1980. Revenues from wholesale customers under Federal Energy Regulatory Commission jurisdiction ranked second, followed by Idaho customers. Wyoming customers account for about 1%, but this is growing with increased demand created by accelerated energy development in the Overthrust Belt. Table 52 shows the customers served and the energy supplied by UP&L. The UP&L system is interconnected with 13 adjacent power systems and can draw on the generating resources of five major power pool.<sup>92</sup>

TABLE 52  
CUSTOMERS SERVED AND ENERGY SUPPLIES  
BY THE UTAH POWER AND LIGHT COMPANY

	<u>Utah</u>	<u>Idaho</u>	<u>Wyoming</u>	<u>Total Company</u>
<u>Number of Customers</u>				
Residential (inc. farm)	350,153	33,159	2,958	386,270
Commercial	30,895	4,354	553	35,802
Industrial	6,669	843	195	7,707
Street lighting	1,290	71	9	1,370
Sales for resale	39	7	1	47
Other	43	--	--	43
Total	389,089	38,434	3,716	431,239
<u>Mwh Sold</u>				
Residential (inc. farm)	2,459,625	446,799	24,268	2,930,692
Commercial	2,008,925	139,675	20,330	2,168,930
Industrial	3,759,062	1,680,659	66,591	5,506,312
Street lighting	52,298	2,697	500	55,495
Sales for resale	3,491,275	753,370	188,016	4,362,661
Other	403,399	--	--	403,399
Total	12,174,584	3,023,200	299,705	15,427,489

Source: Utah Power and Light Company, December 31, 1980.

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UP&L has become primarily a coal-fired utility with some 94% of the company's generation supplied by coal. In 1980 the company burned 6.8 million tons of coal. Hydroelectric generation supplies 4% and natural gas and oil supply 2% of the company's generation. UP&L owns or has long-term contracts for enough low-sulfur coal to fuel all of the company's existing plants and the Hunter third unit, which is scheduled for operation in 1983. The reserves are estimated to supply the fuel for the expected lives of the units, and most of the units are located at or near these reserves.<sup>93</sup> Table 53 shows existing plants and plants under construction owned by the Utah Power and Light Company.

In 1980 the average price paid per kilowatt hour by UP&L customers in Utah was \$6.07; in Idaho, \$4.97; and in Wyoming, \$3.83. The average cost per million BTUs of all fuels (coal, oil, and gas) was \$108.07 in 1980. In 1980 consumption of coal by UP&L totaled 6,814,811 tons; oil and pitch 128,305 barrels; and gas, 4,110 million cubic feet.

The population on UP&L's service territory is growing three times as fast as the rest of the country. The company is working with customers to reduce capital expenditures to some extent through load management programs. Conservation programs and the possibility of co-generation (with customers requesting over five megawatts of electricity) are being studied by UP&L. The company expects its ongoing load management programs, particularly those for

TABLE 53  
GENERATING FACILITIES OF THE UTAH POWER AND LIGHT COMPANY

	<u>No of Units</u>	<u>Capability</u>
<u>Electric Generating Plants</u>		
Stream-electric		
Hunter	2	780,000 Kw
Huntington	2	815,000 Kw
Naughton	3	710,000 Kw
Gadsby	3	246,000 Kw
Carbon	2	171,000 Kw
Hale	1	45,000 Kw
Jordan	1	24,000 Kw
Subtotal		<u>2,791,000 Kw</u>
Gas-turbine		
Little Mtn.	1	15,000 Kw
Hydroelectric (medium water year)		
Grace	3	33,000 Kw
Cutler	2	29,000 Kw
Oneida	3	28,000 Kw
Soda	2	7,000 Kw
Cove	1	7,000 Kw
Small hydroelectric	22	<u>20,000 Kw</u>
Subtotal		<u>124,000 Kw</u>
Total Company Resources		2,930,000 Kw
<u>Generating Units Under Construction and Planned</u>		
Steam-electric		
Hunter (3rd unit) <sup>1</sup>	1	400,000 Kw
Hunter (4th unit) <sup>2</sup>	1	400,000 Kw

Notes:

<sup>1</sup>Projected completion date is June, 1983; estimated cost is \$400 million.

<sup>2</sup>Projected completion date is June, 1985; estimated cost is \$360 million.

Source: Utah Power and Light Company.

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irrigators, to conserve substantially in the future. More than 22,000 kilowatts were saved in 1980 through the irrigation program. The company expects eventually to control 46,000 kilowatts of electricity through the pumping and irrigation programs, thus helping the management of peak loads in the summer. The load management programs are expected to save nearly 147,000 kilowatts annually by 1987. These programs include commercial, industrial, residential energy audits, commercial air conditioning and residential water heating load control, energy-efficient housing, and the home energy advisor's work in the community, in addition to the pumping and irrigation programs.<sup>94</sup>

The Overthrust Belt in southwestern Wyoming and northeastern Utah has emerged as an energy center of national importance of future oil and gas supplies. Estimates of discovered reserves in the overthrust belt exceed 900 million barrels of oil and nine trillion cubic feet of gas. In addition, about 3,000 square miles of Utah and many acres in southwestern Wyoming sit atop oil shale reserves estimated at about 320 billion barrels. Oil-impregnated sandstone-tar sand is another of the areas importance mineral fuel resources. The Utah Power and Light Company is currently studying a technology that produces synthetic oil and char from coal whereby one ton of coal could be converted into one barrel of crude oil and one half ton of char. Energy Synfuels Associates has announced plans to build a giant coal gasification plant in Emery and Carbon counties in Utah. UP&L plans to build its first 20,000-kilowatt geothermal power plant by 1984. A number of other major projects are currently underway in Utah to recover resources and produce more power.<sup>95</sup>

Mountain Fuel Supply Company produces and purchases gas from fields in Colorado, Wyoming, and Utah. The company also purchases gas from five pipeline companies. Gas is transported to its market area in southwestern Wyoming and north and central Utah through two major pipeline systems. One system originates in northwestern Colorado and runs through southwestern Wyoming into the company's Utah market area. The other system originates in eastern Utah and terminates within the company's Utah market area near Provo, Utah. This system, entirely within the State of Utah, receives gas from fields in eastern and central Utah and from the pipelines of Mesa Pipeline Company; Mountain Fuel Resources, Inc.; and Uinta Pipeline Corporation.<sup>96</sup>

Mountain Fuel Supply company distributes gas to residential, commercial, and industrial customers in northern and central Utah and in southwestern Wyoming, including the major Utah cities of Salt Lake, Ogden and Provo. As of December 31, 1980, the company was serving 394,967 residential and commercial customers, and 619 industrial customers. The company's oil operations consisted of 2,914,370 barrels in 1980.<sup>97</sup>

## 7. Public Services

### 7.1 Police Protection

Tooele County law enforcement is the responsibility of the County Sheriff in unincorporated areas. The Department has 13 full-time officers and 10 patrol cars. The Tooele County jail serves both unincorporated and incorporated areas with a cell capacity of 24 males and four females. An expansion is currently underway for an additional four cells.

Tooele City has 26 full-time officers in addition to the police chief. Police staffing in other incorporated towns includes one marshall and three officers at Grantsville; one full-time and one part-time officer at Stockton; and two officers supplied by the county at Wendover.

In addition, the County Sheriff's office has a 20-man volunteer jeep patrol utilizing four-wheel drive vehicles. This patrol is called in as needed and has equipment for such emergencies as water rescue.

## 7.2 Fire Protection

The Tooele County Sheriff also serves as fire marshall for the county. The county has acquired equipment and placed it in the incorporated towns under cooperative agreements for mutual assistance in fighting fires in both incorporated and unincorporated towns. Fire protection is provided by an all-volunteer force both in the county and in cities. However, the cities do have their own departments. Tooele City is the largest with 50 trained volunteers. Grantsville is the second largest department with 30 trained volunteers. These two towns are the only departments that have formal training programs for volunteers.

Equipment is stationed in Tooele, Grantsville, Stockton, Stansbury, Lakepoint, St. John, Clover, Vernon, and Wendover. The county also has cooperative agreements with Dugway Proving Grounds and the Tooele Army Depot for firefighting.

## 7.3 Parks and Recreation

In the immediate Salt Lake County and Tooele County area six canyons open into the Salt Lake Valley. Skiing season is from November to May at a variety of resorts relatively close to Salt Lake. The nearby Wasatch-Cache National Forest provides 30 improved camping and picnicking areas and 800 miles of hiking trails. Fishing, hunting, and other outdoor recreation is also available in the nearby Wasatch Mountains.

Salt Lake City is the recreational and cultural center of the area. The city offers a wide range of spectator sports including hockey, Pacific Coast League baseball, and National Basketball Association basketball in the Salt Palace. As the arts and cultural center of Utah, Salt Lake City is the home of the Utah Symphony and several ballet and repertory dance companies.

The employees of TEAD rely primarily on Salt Lake City for urban entertainment and recreation. However, the City of Tooele has seven parks with recreational facilities and there are two golf courses in the immediate vicinity. In Tooele County there are a total of 19 existing parks and recreation areas comprising 844 acres.

#### 7.4 Schools

Tooele School District provides educational services for grades K-12 within the county. The District operates 11 elementary schools, one junior high school, and three high schools (see Table 54). Total enrollment was 6,993 in 1980, representing a 1.1% increase over the 6,916 students enrolled in 1971. During that nine-year period there was substantial decrease (260 students) in high school enrollment and a modest decrease (35 students) in junior high school enrollment. However, these losses were more than offset by an increase (339 students) in elementary schools.

TABLE 54  
PUBLIC SCHOOL ENROLLMENT IN TOOELE COUNTY

<u>School</u>	<u>Grades</u>	<u>Location</u>	<u>Enrollment</u>	
			<u>1971</u>	<u>1980</u>
Grantsville High	7-12	Grantsville	498	523
Dugway High	7-12	Dugway	329	247
Wendover High	7-12	Wendover	104	134
Tooele High	9-12	Tooele City	1,531	1,298
Tooele Junior High	7-8	Tooele City	775	690
Dugway Elementary	K-6	Dugway	476	288
East Elementary	K-6	Tooele City	446	412
Harris Elementary	K-6	Tooele City	645	675
Tooele Central Elementary	K-6	Tooele City	671	612
West Elementary	K-6	Tooele City	589	518
Grantsville Elementary	K-6	Grantsville	593	818
Stockton Elementary	1-6	Stockton	77	43
Ibapah Elementary	1-6	Ibapah	11	13
Vernon Elementary	1-6	Vernon	34	45
Wendover Elementary	K-6	Wendover	128	225
Stansbury Elementary	K-6	Stansbury	--	370
Total			6,916	6,993

Source: Utah State Board of Education, Master Plan, 1972, Utah Public School Directory, 1981-1982.

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Pupil/teacher ratios in the Tooele School District averaged 19.9 in 1980, compared to 21.8 in the state as a whole. Likewise, the total expense per pupil was under the state average of \$2,105 at \$2,057 per pupil. The capital outlay portion of this expense was only about half of the statewide average due to the slow growth of the Tooele School District.<sup>98</sup>

#### 7.5 Health Services

A 1972-73 patient-origin survey (the latest available) indicates that Tooele County residents leave the county for a wide variety of specialty services. Residents of Tooele County generally travel to Salt Lake County for general surgery; internal medicine; orthopedic surgery; ear, nose, and throat services; and obstetrics/gynecology. The study indicated some potential

demand within Tooele County for urology, ophthalmology, pediatrics, and psychiatry, but projected that only three of these five specialties would be provided in Tooele County by 1990. No significant changes are foreseen in-patient referral patterns. However, some staff will have to be added at Tooele Valley Hospital to maintain current population to physician ratios.<sup>99</sup>

According to estimates by the Regional Health Planning Agency, 18% of Tooele County's population is outside of a 30-mile radius from a general hospital. This is higher than the average for non-metropolitan counties which is 7%. There are six counties with higher figures, but all are considerably small than Tooele in population. In 1975 Tooele County retained 26% of resident hospital admissions, which represented a slight decrease since the 1972-73 survey.

Resident hospital admissions, tabulated from the 1972-73 patient-origin survey, numbered 136.2 per 1,000 population. This was slightly lower than the statewide average of 140.7 per 1,000. Another measure of hospital utilization is the number of patient days per 1,000 population during a year. Tooele County patient days numbered 708.6 per 1,000 population based on the survey, which was below the statewide average of 744.2 per 1,000 population. Combining these two measures yields an average length of stay figure of 5.2 days for Tooele County. As with other measures, this figure is below the statewide average, but not so far below as to indicate underutilization of health care services.

Tooele County's good access to the major medical center in Salt Lake City provides adequate health care availability, although some new specialties will be needed as population grows to maintain basic medical service in the county. The hospitals and medical centers in Tooele and Salt Lake counties are listed in Table 55.

## 8. Human Health

Public health problems as indicated by cause-of-death statistics indicate that Tooele County is slightly below average in old-age deaths but above average in violent deaths, as shown in Table 56. The classification of preventive deaths in the table is a measure of underdevelopment of health care services and was at the same level in Tooele County as the state as a whole.

In the category of violent death, Tooele County was well above the state average (18.3% compared to 12.4%). This was due to almost entirely to the sub-category of accidental deaths (see Table 57), over 60% of which were non-occupational motor vehicle accidents. This may be due to the large numbers of non-residents commuting to and from jobs in Tooele County from other counties.

## 9. Historic and Archaeological Resources

Tooele Valley and Rush Valley have supported four separate Indian cultures. The Early Desert Archaic culture inhabited the area some 11,000 years ago followed by the Late Desert Archaic, Freemont, and Numic-speaking cultures.<sup>100</sup>

TABLE 55  
HOSPITALS/MEDICAL CENTERS IN  
TOOELE AND SALT LAKE COUNTIES

		<u># of Beds</u>
<u>Tooele County</u>		
Tooele Valley Hospital	9	38
Practicing physicians	11	
Practicing dentists	29	
Nurses (RN and LPN)		
<u>Salt Lake County</u>		
Latter Day Saint's Hospital		570
St. Mark's Hospital		306
Holy Cross Hospital		343
University Medical Center		310
Veteran's Administration Hospital		521
Valley West Hospital		105
Cottonwood Hospital		243
Lakeview Hospital		129
Primary Children's Hospital		154
Shriner's Hospital		45
Practicing physicians	683	
Practicing dentists	195	
Nurses (RN and LPN)	1,585	

Source: Utah Industrial Development Division, "Utah: County Economic Facts," 1980 edition.

TABLE 56  
DEATHS BY MAJOR CLASSIFICATION  
1979

	<u>Chronic Old Age</u>	<u>Preventive<sup>1</sup></u>	<u>Violent</u>	<u>Residual</u>	<u>Total</u>
State of Utah	5,710	617	974	570	7,871
Percentage	72.5	7.8	12.4	7.2	100.0
Wasatch Front	3,737	375	616	382	5,110
Percentage	73.1	7.3	12.1	7.5	100.0
Davis County	342	62	63	38	505
Percentage	67.7	12.3	12.5	7.5	100.0
Morgan County	24	1	4	4	33
Percentage	72.7	3.0	12.1	12.1	100.0
Salt Lake County	2,561	228	410	267	3,466
Percentage	73.9	6.6	11.8	7.7	100.0
Tooele County	102	12	28	11	153
Percentage	66.7	7.8	18.3	7.2	100.0
Weber County	708	72	111	62	953
Percentage	74.3	7.6	11.7	6.5	100.0

Note:

<sup>1</sup>Preventive causes are those which result in higher mortality rates in underdeveloped areas, such as parasitic diseases and diseases of early infancy.

Source: Utah Bureau of Health Statistics, "Utah Vital Statistics 1979," April 1981.

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TABLE 57  
VIOLENT DEATHS BY CAUSE  
1979

	<u>Utah</u>	<u>Davis County</u>	<u>Morgan County</u>	<u>Salt Lake County</u>	<u>Tooele County</u>	<u>Weber County</u>
Accident	622	44	4	246	21	65
Percentage	63.9	69.8	100.0	60.0	75.0	58.6
Alcoholism	71	1	0	30	2	17
Percentage	7.3	1.6	0.0	7.3	7.1	15.3
Suicide	179	9	0	85	61	17
Percentage	18.4	14.3	0.0	20.7	14.3	15.3
Homicide	62	5	0	31	0	7
Percentage	6.4	7.9	0.0	7.6	0	6.3
Undetermined	40	4	0	18	1	5
Percentage	4.1	6.3	0.0	4.4	3.6	4.5
Total	974	63	4	410	28	111

Source: Utah Bureau of Health Statistics, "Utah Vital Statistics."

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The Late Desert Archaic culture (ca. 3600 B.C. to ca. 600 B.C.) moved upland when the marshy areas around Lake Bonneville dried up and the lake receded. Their stone tools and artifacts are believed to have been the same as those used by the Early desert Archaics.<sup>101</sup>

The Fremont culture (ca. 700 A.D. to ca. 1400 A.D.) was the most important in the area from an archaeological perspective. The Fremonts were horticulturally oriented, augmenting their diet with hunting. Fremont hunting and recreational sites are located in the Sandy Hills Area. Pottery and bows and arrows were used by the Fremonts and some artifacts have been found in this area.<sup>102</sup> The Fremonts set up a community on South Willow Creek with over 100 pit dwellings along the banks on land either on the Depot or controlled in part by the Depot. Eight of the dwellings are within the Depot's perimeter fence. The dwellings off the Depot have been severely damaged by archaeological excavation in the past. The other eight dwellings are relatively undisturbed. An 80-acre reservoir is planned by the Utah Department of Natural Resources for South Willow Creek abutting the Depot and on lands controlled in part by the Depot.<sup>103</sup> The planned reservoir would inundate the majority of the Fremont sites off the Depot.

The Numic-speaking culture (Shoshones) was the last Indian culture in the vicinity. This tribe appeared 100 to 200 years before the Fremont culture disappeared. The Numic-speaking culture, which was a more nomadic hunting culture than the Fremont peoples, adapted to the increased aridity of the aridity and still live nearby on the Goshute Reservation and the Skull Valley Indian Reservation.<sup>104</sup>

There are 43 "potential" historic sites in Tooele County including oil trails, cemeteries, Pony Express stations, mills, and ghost towns. Three are in the City of Tooele; (1) a log cabin; (2) a plastered adobe house; and (3) the Tooele County Courthouse.<sup>105</sup>

## 10. Aesthetics

The environmental amenities of both the North and South Areas are their vast panoramic views with mountain backdrops rising almost vertically out of the flat valleys. When there is little air pollution, features such as the Great Salt Lake Can be seen from great distances because of the lack of humidity. The views are particularly pleasing aesthetically in the spring and early summer when the flowering plants bloom.

### III. IMPACT ASSESSMENT

#### A. Introduction

The purpose of this section is to analyze the environmental and socio-economic consequences of operation of the Tooele Army Depot. The analysis is based on appropriate guidelines contained in Environmental Effects of Army Actions (AR 200-2; 32 CFR Parts 650, 651; effective date November 3, 1980).

The analysis examines the direct, indirect and cumulative effectiveness of operation of the Tooele installation. The subjects addressed are divided into two major categories: (1) the physical environment; and (2) the human environment. Most of the effects identified under the physical environment are direct or cumulative impacts. Those identified under the human environment tend to be indirect.

The analysis is structured to focus attention on two alternative courses of action. The first alternative is based on continuation of existing operations at the installation, including minor new construction identified in the installation's current master plan. Most of the new construction would replace existing buildings rather than expand base activities. The second alternative given analysis is the potential closure of the Tooele installation. Closure in this context means that all present operations on both the North Area and the South Area would cease. The analysis generally assumes a return of base areas to their natural condition. No other alternative use for the installation sites is addressed herein.

It should be noted that there are no known plans which call for closure of Tooele or for uses other than those presently in operation. One other potential alternative not addressed in this assessment is the operation of the installation under full emergency mobilization.

## B. The Physical Environment

### 1. Geology and Mineral Resources

#### 1.1 Continued Depot Operation

##### a. North Area

Approximately 65% of the area occupied by TEAD-N is covered by Lake Bonneville shore deposits (Qb), consisting of a relatively thin layer of gravel, sand, and silt ranging from zero to 200 feet in depth. (See the map on page 41.) The remainder of the area is covered by Post-Lake Bonneville alluvium (Qya), consisting of very thin sheets of sand or silt ranging from five to 15 feet in depth. Both of these overburdens are generally unconsolidated.

Underlying these deposits is the Salt Lake Group, consisting of unconsolidated to consolidated sandy gravel, silts, and clays.<sup>106</sup> The thickness of this deposit is not known but appears to vary considerably. A very small amount of bedrock probably lies near the surface in the northeast portion of the Depot. In other areas, however, drilling operations have not encountered bedrock at depths ranging from 450 to 1,500.<sup>107</sup>

The only known mineral resources on TEAD-N are sand and gravel. Depot sand and gravel have been and will continue to be used for various road building and construction activities. Impacts upon these resources are minor, however, considering the large quantity of sand and gravel potentially available within the Depot boundaries. Ongoing salvage operations, particularly for copper and lead, mitigate the potential inadvertent loss of important minerals by Depot use.

No known faults underlie the North Depot Area and only two "micro-earthquakes" have been recorded on Depot land apart from those clustered around the munitions disposal area. No geological impacts have been noted from Depot activities, and there has been no increase in the hazard of earthquakes. However, the numerous micro-earthquakes recorded in conjunction with munitions disposal operations may indicate that there are potentially active faults that remain undetected under the North Area. For this reason, any significant change in munitions disposal operations which would result in the release of larger amounts of energy or the release of energy in deeper, more stressful environments may have the potential to adversely impact the Depot's geology and increase the earthquake hazard. On the other hand, the elimination of stress before it reaches potentially hazardous levels might turn out to be beneficial.<sup>108</sup>

##### b. South Area

Slightly over half of the area occupied by TEAD-S is covered by Post-Lake Bonneville alluvium (Qya), consisting of very thin sheets of sand or silt five to 15 feet thick. (See the map on page 43.) Most of the remainder of the Depot is covered by either Older (Pre-Lake Bonneville) alluvium (QToa), which ranges from coarse gravel to sand and silt up to 500 feet thick, or thin layers of Older alluvium over rock pediments (Qtp) which lies near the surface.<sup>109</sup> Wells have been drilled to depths of 405 and 550 feet without encountering bedrock.<sup>110</sup>

As in the case of the North Area, the only known mineral resources on South Depot land are sand and gravel, which are used in Depot road building and construction operations. The amounts used are small in comparison to the amounts available. Salvage operations minimize the likelihood that valuable minerals will be lost through Depot use.

TEAD-S lies approximately one mile west of the Northern OBT fault zone and the Depot overlies portions of the Mid-Valley Horst Fault Zone. Both of these fault zones may be considered as potentially active. No "micro-earthquakes" have been recorded on TEAD-S land.<sup>111</sup> There are no operations occurring or planned on TEAD-S which might increase earthquake hazards or otherwise affect the area's geology.

## 1.2 Depot Closure

Depot closure would have only minor impacts on the geology and mineral resources of either the North Area or the South Area. In both instances, the use of Depot sand and gravel resources would be discontinued. More importantly, perhaps, closure of the North Depot would eliminate the micro-earthquakes associated with munitions disposal operations. While such operations have not increased earthquake hazards in the past, it is possible that the area has potentially active faults which are currently undetected.

## 2. Soil

### 2.1 Continued Depot Operation

#### a. North Area

Operation of TEAD-N has no direct impact on Tooele Valley soils except within Depot boundaries. The Depot does have an indirect impact on valley soils insofar as Depot employees require off-Depot housing and other facilities, which overcover and otherwise disturb the soils. However, such impacts are very minor.

The most current soil survey for the Tooele Army Depot was conducted in the mid-1940s. This survey was conducted at an Order 4 level, involving a broad, general survey dealing primarily with the determination of range types. Therefore, available data is limited. Recently more detailed surveys have been conducted in both Tooele and Rush Valley, but not on Depot land. The soil information provided here is a result of an analysis of the older data, combined with interpolations from more recent data for similar soils outside but near the Depot.<sup>112</sup>

Soils on TEAD-N can be classified into four general groups as follows:

Group 1: A relatively thin, loamy soil over either gravel or a mixture of sand and gravel. This soil contains varying amounts of gravel and/or cobble mixed with a medium-textured soil material. Approximately 43% of the Depot is comprised of this soil, which lies on slope gradients of 1% to 5%.

Group 2: A deep loam or silty loam overlying silty or gravelly clay loam, with some gullies occurring under native conditions. These soils are found on slope gradients of 1% to 5%. Approximately 24% of TEAD-N soils are Group 2 soils. The majority of these soils occur in the Desert Bench Range classification and are moderately saline-alkaline. Lime is leached from the surface and redeposited in the subsoil.

Group 3: Medium-textured, deep loam soils over a loam subsoil and substratum. Slope gradients vary from 3% to 6%. This is a small soils group comprising only 8% of the Depot's soils.

Group 4: Deep, moderately light-textured soils of sand loam overlying sandy loam or loamy sand. Slope gradients range from 2% to 10%. This group comprises approximately 25% of the Depot's soils.

The distribution of these soil groups is shown on the map on the following page. Soil group characteristics are summarized in Table 58.

Only limited soil sampling and chemical analysis has occurred on TEAD-N in the past. The most recent analysis was performed by Utah State University in 1973. All samples were taken from the southeast portion of the Depot, which is an area comprised of the Foothill range designation. Four soils were identified, which may belong to either the Group 1 or the Group 3 soils discussed above: Ashley gravelly loam (AH 32H3/4C); Bakins Loam (Be 34 H1/5C); Genola loam (Ge 3331/5C); and the Mellor, Manassa complex (Ml Ma 32K/3B-A1). For further information about these soils, see the Land Management Plan for Tooele Army Depot and South Area Activity.<sup>113</sup>

Operations at TEAD-N have disrupted, displaced, compacted, uncovered, and overcovered Depot soils. In fact, during the 40 years of Depot operation, it is likely that the majority of the soils have been impacted to some degree.

The most significant impact has been permanent overcovering. Nearly 900 acres have been overcovered by buildings and structures, most of which (84%) has been for transportation-related facilities: roads, parking areas, and railroad tracks. A second significant impact on soils have resulted from the use of over 700 acres for open storage. While overcovering by open storage is temporary, the continuous movement of heavy vehicles through these areas has compacted the soils. Additionally, individual spills and minor oil and gas leaks have had a cumulative impact potentially contaminating some areas.

However, less than 10% of the Depot soils have been overcovered or used for open storage to date. Based on the Master Plan, approximately 40 acres for additional soils will be impacted by future construction activities, increasing the area of significantly impacted soils by less than 1%.

Approximately 75% of all of the soils on TEAD-N have a moderate water erosion potential. The Group 2 soils which comprise the Desert Bench possess a high water erosion potential. Most of the soils which form Group 2 and comprise Sandy Hills are highly susceptible to wind erosion. If the vegetative cover is removed and the soils left exposed, dunes with steep slopes may form. This phenomenon occurred during the 1930s.

TABLE 58  
SOILS - TEAD NORTH

	<u>Group 1</u>	<u>Group 2</u>	<u>Group 3</u>	<u>Group 4</u>
Soil Symbols	03H/03J	3221 3221 <sup>1</sup>	331	441
<u>Characteristics</u>				
Range Association(s)	Foothill	Upland Loam Desert Bench	Upland Loam Foothill	Sandy hills
Depth	20"	36"	36"	36"
Permeability	Moderate	Moderate	Moderate	Moderate
Shrink-Swell Potential	Low	Low	Low	Low
Erosion Potential	Moderate	Moderate-High	Moderate	Moderate <sup>1</sup>
Fertility	Low	Low	Low	Low
<u>Limitations</u>				
Septic Tanks	Severe	Moderate	Slight	Severe
Roads	Slight	Moderate	Slight	Slight
Foundations	Slight	Moderate	Slight	Moderate

Notes:

<sup>1</sup>High if vegetation is removed and soil is left exposed to winds. Group 4 soils may form dunes with very steep slopes.

N.B. This table contains general data. Further study is required for site-specific data.

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Except for periods in the past when soils were probably left exposed for long periods during construction activities. TEAD-N operations appear to have had only minor negative impacts in terms of erosion. Generally, Depot activities under the Land Management Plan have been beneficial and large areas which were once denuded or supported only a sparse vegetative cover have been rehabilitated, thereby reducing erosion hazards. Steeper slopes near the munitions disposal area give some indication of past erosion which probably occurred during the occasional heavy storms which pass across the Depot.

Future planned construction activities have the potential for increasing erosion hazards by exposing the soils to wind erosion. This potential impact should be minor, however, as future construction activities will be phased over a relatively long period of time and only small areas of soil will be exposed at any one time.

Slope instability have been a significant problem on TEAD-N. Existing excavations and embankments can be found in roadway, lagoon, holding pond, landfill, and drainage facilities. These facilities generally contain slopes less than 25 feet and have been designed using adequate safety factors; many are covered by vegetation or other materials. (Slopes in landfill areas are temporary.)

Potential slope instability impacts exist from demolition activities along the ridge located in the southwest corner of the Depot, but past experience indicates no major problems. Some excavation and embankment work is periodically required on the Depot; however, if drainage continues to be properly addressed and slopes are limited to 25 feet in height, a preliminary soils investigation should ensure adequate stability.

Mass slides including mud flows and liquefaction require full soil saturation. The possibility of this condition occurring on an unretained slope at the TEAD-N installation is negligible. Saturated clay areas (playa) at TEAD-N lie in low flat terrain and to date no major unretained slopes have experienced slope stability problems.

The primary agricultural value of the soils on TEAD-N is as rangeland. The soils are of generally low fertility and many are saline-alkaline affected. However, Soil Groups 2, 3, and 4 are usable as cropland when a steady source of irrigation water is available.

Current grazing practices on TEAD-N are slowly reducing the fertility of the soils on a substantial portion of the Depot due to the removal of nutrients. Although this is only a minor impact on an annual basis, the cumulative impact upon the agricultural value of Depot soils has been significant.

Contaminated soils in several areas at TEAD-N have the potential to impact the agricultural value of those areas by either inhibiting the growth of vegetation or transferring detrimental substances to animal species. The greatest potential for this to occur is at the outfall area associated with the maintenance and repair facilities. Currently there is no evidence to indicate that the agricultural value of any soils is being reduced and the impacts appear to range from negligible to minor. However, the potential for eventual significant impacts upon specific areas cannot be discounted.

#### b. South Area

As in the case of TEAD-N, operation of TEAD-S has only indirect impacts on soils off Depot land.

One soil type, Neola gravelly loam, predominates in the South Depot Area. The Land Management Plan for Tooele Army Depot and South Area Activity describes this soil as follows:

This soil is called Neola gravelly loam and is the kind of soil found in the entire area. This soil is typically shallow (less than 20 inches deep) over a lime cemented gravel hardpan. This hardpan is very strongly cemented, and while it is not impervious to roots and water it is very nearly so. This hardpan averages about 1 foot in thickness, however, there are places where it is thicker and thinner. The hardpan is in a zone of high lime accumulation. In some places the hardpan is 95% gravel with just enough lime and soil to make a cementing agent.

. . . Chemical analyses of soils - Utah State University soil Laboratory tests dated 1 March 1973. This soil is calcareous throughout with a pH of 8.4 in the surface soil and 8.8 to 9.0 in the deeper sub-soil. Organic matter is normal, but salt content is very high. The 4" to 20" depth is about 1/2 of 1 percent which affects most plants; below 20" the salt content is between 1 and 2 percent; most plants will not survive in this must salt. Percent of lime is also very high, ranging from 25% to 93%.

. . . Standard soil description of soil texture: The surface soils (on top of the hardpan) are gravelly loam in texture; they are soft when dry, and friable when moist. The soil under the hardpan is also gravelly loam and has the same physical characteristics as the surface soil. This soil is underlain by gravel and cobble rocks below 4 feet with a matrix of coarse sand.

A more recent and more detailed survey has been conducted off the Depot, indicating a variety of soil types approaching the Depot boundaries and suggesting that more than one type of soil exists on the Depot. The predominant soils adjacent to the Depot boundaries have been preliminarily identified as follows:

West Boundary: Manassa silty clay loam (TAA), 0-3 percent slopes. A very deep well drained soil on alluvial flood plains; seven inch topsoil overlying 53 inches of silty clay loam; slow permeability.

North Boundary: Dixie-Manassa complex (GLC), 1-6 percent slopes. Very deep, well drained soils on alluvial fans; seven to 12 inch topsoils overlying 48 to 53 inches of silt loam, gravelly loam, and gravelly clay loam. Small areas contain surface gravel, rock fragments in the soil, and hardpans at 10 to 20 inches and layers of lime. Permeability; slow to moderate.

East Boundary: Hiko Peak gravelly loam (HCD), 3-20 percent slopes. Very deep well drained soil on alluvial fans; four inch topsoil overlying 56 inches of gravelly loam. Layer of lime at 13 to 60 inches; 15 to 40 percent of surface covered with gravel. Moderate permeability.

South Boundary: Bylo silt loam, alkali (ZDA), 0 to 2% slopes. Very deep well drained soil on basin floors; five inches of topsoil overlying 55 inches of silt loam; layer of sodium accumulation between 0 and 14 inches. Moderately slow permeability. 114

Impacts on the soils of TEAD-S are similar to those discussed previously for TEAD-N, though there is less disturbance at TEAD-S. Approximately 225 acres are permanently overcovered and an additional 45 acres are used for open storage. Thus, less than 5% of the Depot's soils have been significantly impacted to date. Future planned construction will impact less than one acre.

The hazard of wind and water erosion varies from slight to moderate at TEAD-S. The occurrence of erosion is more evident at TEAD-S than at TEAD-N, due primarily to sparser vegetative cover. The effects of minor wind and water erosion can be found scattered throughout TEAD-S.

Slop stability at TEAD-S is generally the same as discussed previously for TEAD-N.

The primary agricultural value of the soils at TEAD-S is as rangeland, although Manassa silty clay loam is used for pasture where a dependable source of water is available. A larger percentage of the soils at TEAD-S are contaminated and unusable for agricultural purposes than at TEAD-N. The 1,700-acre demolition, burning, and burial area which runs along the southern boundary of TEAD-S is the primary contaminated area.

## 2.2 Depot Closure

Depot closure would impact the soils at TEAD-N and TEAD-S in relatively minor ways. Presumably the buildings and structures on Depot land would remain standing and the soils currently overcovered would remain overcovered. However, Depot closure would preclude the additional overcovering of 40 acres at TEAD-N and once acre at TEAD-S that is currently planned. In addition, Depot closure would eliminate the compacting of soil in open storage areas.

Closing the Depot might reduce the potential for erosion on Depot land to some extent by reducing man-made impacts and increasing vegetative cover.

Slope instability would be affected to a minor degree by Depot closure. The primary impact would result from the elimination of the potential for slope instability resulting from demolition activities.

Finally, Depot closure would probably have a beneficial impact on the agricultural value of the soils on Depot land, unless grazing is allowed to continue as at present or is intensified. In the long run, it might even be possible to reclaim some of the currently contaminated soils on Depot land.

## 3. Topography and Drainage

### 3.1 Continued Depot Operation

#### a. North Area

Gentle to moderate slopes are generally found throughout the North Depot Area, as shown on the map on page 125. The degree of slop decreases near the central and northern portions. The average slope on the Depot is 3%. Elevations range from 5,250 feet near the southwestern boundary to 4,435 feet at the north central boundary.

There are no perennial streams on the Depot, and surface water flow only in direct response to rainfall and snow melt. (Both South Willow Creek and Box Elder Wash are classified as perennial streams, but their water are diverted for irrigation prior to reaching the Depot.)

During periods of heavy rainfall or rapid snow melt, drainage flows in the northerly direction along natural stream beds and drainage courses, and as sheet flow. However, these waters normally infiltrate into the soil and only rarely leave the Depot.

Except for very localized changes, TEAD-N activities have had little impact on topography and drainage. There are no planned construction activities which will cause other than localized effects.

#### b. South Area

Slopes on TEAD-S range from zero in the southwest portion of the Depot to 16% in the north central portion, as shown on the map on page 133. The degree of slope generally decreases from northeast to southwest. The highest elevation in the northeast portion of the Depot is 5,625 feet; in the southwest portion the lowest elevation is 5,044 feet. The average slope is 2%.

Ophir Creek, which enters the Depot near its northeastern boundary, normally contains a small amount of water. Generally, however, surface water flows only in direct response to rainfall and snow melt. Drainage flows generally in a southwesterly/westerly direction and usually infiltrates into the soil before leaving the Depot.

In general, activities on TEAD-S have created only minor localized changes to topography and drainage patterns. Ophir Creek, which has been diverted on the Depot is the primary exception. In addition, during rare periods of rapid snowmelt or heavy precipitation, surplus waters now flow along man-made channels west-northwesterly rather than along the natural drainage channel, which carried the waters to the south-southeast. Due to the infrequency of surplus water, this has a minor impact.

No construction is planned which will significantly affect topography or drainage patterns.

#### 3.2 Depot Closure

Closure of the Depot would have no impact upon topography or drainage patterns at either TEAD-N or TEAD-S.

#### 4. Climate

##### 4.1 Continued Depot Operation

Except for localized changes to surface wind flows caused by buildings and structures, neither TEAD-N nor TEAD-S has any appreciable impact upon climatic conditions. There are no activities discussed in the Master Plan which would increase the impacts of either installation in the future.

##### 4.2 Depot Closure

Depot closure would not have any significant impact on climate. Assuming that buildings and structures remained standing, both TEAD-N and TEAD-S would continue to have minor impacts on localized surface winds.

#### 5. Air Quality

##### 5.1 Continued Depot Operation

###### a. North Area

From data supplied from Tooele Army Depot in March of 1980, the Air Pollution Section of the Environmental Health Service Branch of the State of Utah calculated emission rates for TEAD-N as shown in Table 59.<sup>115</sup> These figures include boilers and deactivation furnaces but do not include open burning and demolition of explosives.

TABLE 59  
POLLUTION EMISSION RATES AT TEAD-N  
1980

<u>Pollutant</u>	<u>Quantity</u>
Particulate Emissions	13 tons/year
SO <sub>2</sub> Emissions	262 tons/year
NO Emission	66 tons/year
HC <sup>x</sup> Emissions	2 tons/year + unknown
CO Emissions	9 tons/year
Volatile Organic Compound Emissions <sup>1</sup>	263.6 tons/year

Note:

<sup>1</sup>"Air Pollution Consultation No. 44-21-0246-82, Photochemically Reactive Emissions," October, 1981.

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Active stationary fuel combustion sources were identified in "Air Pollution Survey No. 44-66-0162-81," which is a paper on a survey completed by the USAEHA in December of 1980. All fuel combustion sources above one MBTU (unit input capacity) were identified. The major fuel used was No. 2 fuel oil, through coal and No. 6 fuel oil are used in some boilers. The major stationary fuel combustion units (i.e., those having more than 10 MBTU per hour or heat capacity) are listed in Table 60.

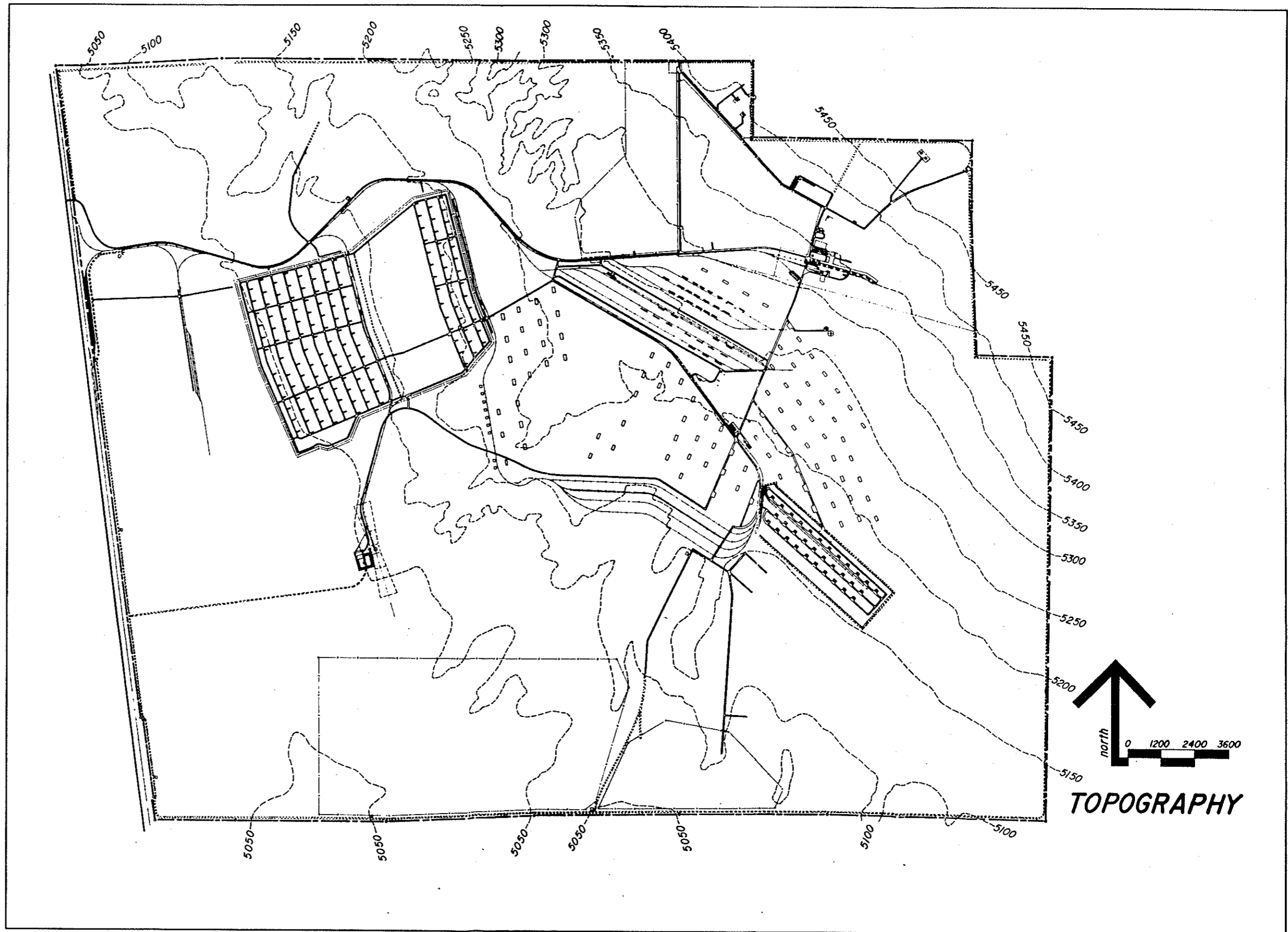


TABLE 60  
MAJOR STATIONARY FUEL COMBUSTION UNITS AT TEAD-N<sup>1</sup>

<u>Building Number</u>	<u>Boilers Per Unit</u>	<u>Unit Input Capacity MBtu/hr.</u>	<u>Stack Height feet</u>	<u>Fuel</u>
606	1	25.1	33	No. 2 Oil
606	1	25.1	33	No. 2 Oil
606	1	25.1	33	No. 2 Oil
610	1	20.2	33	No. 2 Oil
610	1	16.7	60	No. 2 Oil
610	1	16.7	30	No. 2 Oil
637	1	12.6	24	No. 2 Oil
637	1	12.6	24	No. 2 Oil
637	1	12.6	24	No. 2 Oil
37	1	10.5	24	No. 2 Oil
37	L	10.5	22	No. 2 Oil

Note:  
1 Major units have more than 10 MBtu per hour of heat input capacity.

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There are 24 additional units with a heat input capacity between one and 10 MBTU per hour, which burn No. 2 fuel oil and 108 No. 2 fuel-oil-fired units with heat input capacities of less than one MBTU per hour. There are an additional 14 units with hat input capacities less than one MBTU per hour which burn LPG.

A 1967 USAEHA study on the existing coal-fired boiler plants justified their conversion to fuel-fired plants.

The TEAD Master Plan for 1990 recommends the construction of a new coal-fired boiler plant at the northwest corner of C Avenue and 6th Street. The facility will replace an existing oil-fired plant and will consist of three 1,000-horsepower boilers, one of which is designated as standby. Two coal storage silos are also planned to the south of the coal-fired plant.

The replacement of the fuel-fired boiler with the coal-fired unit will result in an increase in particular emissions and reduction of SO<sub>2</sub> emissions (per equivalent BTS/hr input). The facility will have to comply with applicable Utah State air quality standards and should have only a minor effect on ambient air quality.

All gasoline and diesel generators meet opacity standards if they are maintained and operated properly. No significant impact to air quality should result from any generators at TEAD-N.

TEAD has been granted a conditional exemption allowing open burning and demolition of explosives under Utah State Air Conservation regulation 2.1.4.d.

In order to evaluate the effects of demolition activities at TEAD, the open air detonation of TNT was studied.<sup>116</sup> The study found that emission of pollutants (gaseous by-products) of a TNT detonation were a "controversial subject." Results from previous laboratory tests varied and the correlation of lab experiments to in-site detonation is unreliable.

The major gaseous by products were identified as carbon monoxide, nitrogen oxide, and hydrogen cyanide. Neither nitrogen oxide nor hydrogen cyanide was found to present a problem. Dispersion calculations (rough estimates) showed carbon monoxide concentrations could result well above standards established by EPA. Carbon monoxide is toxic in confined spaces over a long duration. These calculations and carbon monoxide toxicity should be an indication that problems may exist and continued study is needed. There is an excellent possibility that a study would indicate evidence that health effects are nil from the detonation of TNT on properly controlled ranges.

The federal standards of performance for storage vessels for petroleum liquids apply to tanks having a capacity of at least 40,000 gallons which were installed after March 8, 1974. The only TEAD-N storage tank of a least 40,000 gallons was installed before this date. Utah State air pollution regulations apply only to existing petroleum storage in ozone nonattainment areas.

The volatile fuel storage facilities at TEAD-N are summarized in Table 61. Any air quality impacts resulting from volatile fuel storage at TEAD-N should be insignificant.

Explosives munitions are demilitarized and disposed of in an APE-1236 deactivation furnace. The APE-1236 furnace has been tested by the U.S. Army Environmental Hygiene Agency and has shown that it can burn a variety of small arms, fuses, boosters, and primers and is in compliance with the Utah air conservation regulations.

Explosives and explosive-contaminated wastes are disposed of by open burning in a remote pit area at TEAD-N. Approximately 5,000 pounds of these materials are burned at one time. The broader use of the APE-1236 deactivation furnace to demilitarize some of the explosives currently open burned requires further study. The state regulation requires a permit for open burning of these wastes. It is necessary to work closely with EPA and state authorities to ensure that these hazardous materials are being open burned under acceptable conditions.

There are two inactive incinerators at TEAD-N. Should these units be activated they must meet the opacity standards of a plume of a shade or density no darker than No. 1 ringleman or 20% equivalent opacity.

Preliminary plans (for the 1990 Master Plan) call for the construction of a solid waste incinerator at the North Area installation. The proposed facility will be located at the south corner of the intersection of C Avenue and 7th Street. The system will consist of three one-ton-per-hour, pre-manufactured, controlled-air solid waste incinerators. Plans call for one or two units on-line with a third for standby. The sizing of the system is based on a waste load of 32 tons per day and a five-day week. Presently TEAD-N generates approximately six tons per day of "urban refuse."

TABLE 61  
VOLATILE FUEL STORAGE AT TEAD-N

<u>Building Number</u>	<u>Existing Storage Capacity</u>	<u>Building Number</u>	<u>Existing Storage Capacity</u>	<u>Building Number</u>	<u>Existing Storage Capacity</u>
1	2,000	145	1,500	672	265
L-1	3,000	147/149	3,000	678	265
L-2	3,000	150	2,000	679	265
L-3	3,000	151	1,500	688	265
L-4	3,000	152	2,000	691	15,000
7	500	153	4,000	700	300
8	3,000	155	265	735	1,000
9	1,000	418	20,092	753	1,000
10	1,000	503	300	1000	2,000
18	110	506	300	1001	530
25	265	508	30,000	1002	1,000
26	265	516	600	1004	500
27	265	518	300	1005	5,000
28	265	519	3,000	1320	3,000
SL-27	3,000	520	4,000	1343	16,048
SL-28	3,000	522	500	1366	600
35	3,000	526	300	1375	6,000
37	38,672	529	300	1376	2,000
50	2,000	594	5,000	AEO Furnace	
52	300	595	10,027	Site by 1376	1,000
53	14,381	606 <sup>1</sup>	121,000		
79	1,000	610 <sup>1</sup>	59,715	<u>Other Storage</u>	
100/105	5,000	614	3,000	1010 (cr. Union)	4,000
101	1,000	616	1,000	549-T (Property)	12,796
103	1,000	622	265	547-T (Property)	12,088
104	3,000	627	500	582 (Property)	500,000
110	1,500	632	265		
111	1,500	634	265	<u>Motor Gas</u>	
112	1,500	637 <sup>1</sup>	24,390	512 T1	15,275 gal.
113/115	3,000	638	265	512 T2	15,275 gal.
114/116	3,000	642	265	629 T2	11,343 gal.
117/119	3,000	643	275	116 T	1,000 gal.
118	2,000	644	265	128 T1	15,275 gal.
120	2,000	645	265	128 T2	15,275 gal.
121/123	3,000	648	265		
122	2,000	652	265	<u>Solvent (waste)</u>	
124	2,000	655	265	629 T4	6,000 gal.
125	1,500	658	265		
126	2,000	662	265		
130	3,265	668	265	<u>JP4</u>	
141	500	671	10,000	600	3 at 400 gal. each
143	500				

Note:

<sup>1</sup>All storage is No.2 fuel oil except buildings 606, 610, and 637; these three buildings are burning No. 6 fuel oil.

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The proposed incinerator will reduce sanitary landfill requirements and impacts. Assuming that approximately 300 pounds of soil are required to cover one cubic yard of refuse (750 pounds), a total estimated 2.85 cubic yards of sanitary landfill are required per ton of refuse. This impact will be greatly reduced as a result of the solid waste incinerator installation. The incineration of waste reduces weight by 70% to 80% and volume by a factor of 10. Approximately 360 to 450 pounds of residual material is produced from one ton of solid waste. This residue's principal constituents are silicon, aluminum, and iron oxides. Heating values from incineration range from 4,000 to 5,000 BTU per pound and normally 1.1 to 1.6 kilogram of steam is available per kilogram of refuse burned.

As a result of solid waste incineration, air quality will be affected by emissions of particulates, SO<sub>2</sub>, NO<sub>2</sub>, CO, and HCl. Untreated stack gas contains approximately 30 pounds per ton of particulates. The usual particulates contain inorganic materials, including detectable amounts of free mercury and beryllium, lead, and zinc. These heavy metals are potential health hazards. Properly controlled stack emissions of inorganic effluent are likely to much lower than 0.1 pounds per ton. Preliminary planning indicates that the incinerator will be designed to comply with all state and federal standards.

While ash is primarily inorganic in character, some organic materials may remain unburned, including chlorinated and polynuclear hydrocarbons. The total potentially hazardous organic materials emitted from controlled stacks are also less than 0.1 pounds per ton.

Other volatile materials may escape combustion causing problems with eye irritation and odor but are fundamentally harmless. These include formic, acetic, palmitic, stearic acid, oleic acids, methyl and ethyl acetate, ethyl stearate, formaldehyde, acetaldehyde, hydrocarbons, and phenols. Potentially hazardous phosgene and hydrogen cyanide can be formed, but it is expected these will be present in very small concentrations. Proper incineration practices, including afterburning with additional fuel, should reduce all of these to unnoticeable or negligible levels.

The proposed solid waste incinerator will reduce SO<sub>2</sub> emissions from the existing oil-fired boilers. Levels of NO<sub>x</sub>, HC, and CO emissions will also be reduced, with an increase in particulate emissions. The reduction in fossil fuel consumption and reduced SO<sub>x</sub>, NO<sub>x</sub>, HC, and emissions will result in an overall beneficial impact assuming proper operation and control of the solid waste incinerator. Based on 1980 fuel records at TEAD-N, approximately 30% of the depot's heating requirements will be generated through incineration. This will reduce fuel usage from 1,755,000 gallons to approximately 1,228,500 gallons per year for heating.

Small and localized dust periodically results from dumping, earthmoving, and compaction operations at the sanitary landfill at TEAD-N. The Depot's size allows for adequate dispersion and settlement during these episodes and no significant impact results. Fugitive dust from various industrial sources (baghouses, unpaved roadways, etc.) is also a source of particulate emissions.

A sand and gravel pit is operated at TEAD-N on a limited basis to produce stone products. Activities consist of loading natural gravel deposits for use on the Depot. The impact of fugitive dust is insignificant and particulate emissions are estimated at 0.1 pounds per ton of material handled.<sup>117</sup>

Transportation-related sources contribute heavily to the CO, HC, and NO<sub>x</sub> emissions levels of the area. According to a 1974 survey of Salt Lake and Tooele counties<sup>118</sup>, approximately 90% of all carbon monoxide and 70% to 80% of all hydrocarbon emissions in the area are the result of highway vehicle operations. All transportation activities combined make up the greatest contribution of NO<sub>x</sub>. However, mobile source pollution at TEAD-N is of minor significance. The private commuter transportation and on-site movement of vehicles make up the mobile sources. Car-pooling is encouraged to mitigate private commuter impacts. All installation vehicles have emission control devices and are constantly being replaced with more efficient units. Only a minor increase in auto traffic would result from planned improvements at TEAD-N.

Due to the relative isolation of odor-producing operations and activities at TEAD-N, odor impacts generally do not occur. Wind direction and intensity and the present or absence of inversion will determine the location and degree of impact.

Apart from the odor associated with motor vehicle exhaust, current potential sources of odor at TEAD-N are limited to the sanitary landfill, the sewage lagoon, drainfields, ammunition and explosive demolitions, and the industrial waste holding pond.

No odor problems have been noted at the sanitary landfill, but the landfill has the potential to produce odors when left uncovered or partially covered.

Nor have any problems with odor been connected with the sewage lagoon. Overloading of the lagoon with high BOD wastes could cause odor. If the lagoon became frozen for an extended period, improper aeration could result in the growth of anerobic bacteria. Later in the spring, unpleasant odors could result.

Properly operating drainfields present no odor problems. Drainfields that become overloaded or clogged can cause effluent to surface, resulting in odors. No drainfield problems have been noted at TEAD-N.

Dirt and dust caused by ammunition and explosive demolitions could have a localized impact. These activities are infrequent and are only carried out during ideal weather conditions, such as winds to the south and absence of inversion.

Overloading of the industrial waste holding pond would result in unpleasant odors. However, no unpleasant odors associated with the pond have been noted.

Operation of the solid waste incinerator proposed in the Master Plan may present some odor problems. A solid waste incinerator will release soot, smoke, fly ash, volatile metals, acids, and other air pollutants. A scrubbing

system will remove 90% to 99% of all pollutants. However, small amounts of volatile materials may escape combustion and recovery systems and may cause problems with odor.

In addition, solid waste "as-received" contains from 20% to 50% water. Drying of waste may be required, which can cause noxious odors. The storage of refuse prior to incineration may also be a source of odors. The solid waste incineration facility is to be located west of the maintenance area. Prevailing winds to the south will reduce potential odor impacts on populated areas on the installation. Incineration of waste will greatly reduce potential odor problems associated with the sanitary landfill.<sup>119</sup>

b. South Area

TEAD-S has eight boiler units which are fuel-fired, ranging in size from nine horsepower to the larger 600-horsepower units located at CAMDS 1 and 2. Table 62 provides a listing of these units. In addition, TEAD-S has four coal-fired units, as shown in Table 63.

TABLE 62  
FUEL-FIRED STATIONARY COMBUSTION SOURCES IN TEAD-S

<u>Building Number</u>	<u>Fuel</u>	<u>Horsepower</u>	<u>MBTU/ hour</u>	<u>1980 Fuel Usage</u>
1	No. 2 Oil	9	0.31	3,802
10	No. 2 Oil	30.8	1.44	8,781
301	No. 2 Oil	9	0.31	2,545
519	No. 2 Oil	30.8	1.44	8,207
539	No. 2 Oil	9	0.31	1,441
553	No. 2 Oil	107	5.36	29,366
CAMDS 1	No. 2 Oil	600	25.1	290,254
CAMDS 2	No. 2 Oil	600	25.1	--

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TABLE 63  
COAL-FIRED STATIONARY COMBUSTION SOURCES IN TEAD-S

<u>Building Number</u>	<u>Fuel</u>	<u>Horsepower</u>	<u>MBTU/ hour</u>	<u>1980 Fuel Usage</u>
124-1	Coal	142	4.75	--
124-2	Coal	142	4.75	750 T.
124-3	Coal	142	4.75	--
544	Coal	14	0.47	70 T.

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Gasoline and diesel generators generally have a non-significant impact and meet the opacity standard if they are properly maintained and operated. The location and emission standards for generators are shown in Table 64.

TABLE 64  
LOCATION AND EMISSION STANDARDS FOR GENERATORS IN TEAD-S

<u>Building Number</u>	<u>Type of Fuel</u>	<u>Year Installed</u>	<u>Percent Equivalent Opacity<sup>1</sup></u>
1	Gasoline	1952	No visible emission
10	Gasoline	1952	No visible emission
North Gate	Gasoline	1970	No visible emission
541	Gasoline	1972	No visible emission
CAMDS Site	Diesel	1975	20
CAMDS Site	Diesel	1975	20
CAMDS Site	Diesel	1975	20

Note:

<sup>1</sup>Allowable Plume Opacity not to be exceeded for more than three minutes in any hour.

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The demilitarization of chemical munitions at TEAD-S is carried out at the CAMDS site. Nerve gas agents are neutralized resulting in the production of a brine. A drying procedure reduces the brine to a salt which is then stored. Small amounts of vapor may be released to the atmosphere as a result.

In addition to the standard air quality testing carried out by the South Area monitoring stations, testing is done for the present of nerve gas Agent GB. Bubbler samples are taken as a testing procedure. To date, the ASLMET (Atmospheric Science Lab Meteorological Team) in charge of the monitoring program is unaware of any episodes of air pollution from Agent GB.<sup>120</sup>

TEAD-S has facilities for the storage of diesel, oil, motor gasoline, and fuel oil. Total storage capacities are 817 BL of diesel oil, 752 BL of motor gasoline, and 28 BL of fuel oil storage. No information is available on individual tank capacities. The proper storage of volatile fuels at the installation should have no significant impact on air quality in the area.

A one-ton capacity incinerator is located at TEAD-S. Properly operated and maintained, a 90% removal of emissions would contribute an additional 0.6 tons per year to particulates to the surrounding air. Both organic and inorganic materials would be negligible (0.1 pounds per ton). In order to comply with air emission standards, the facility must meet the 20% opacity standard. This facility should have no significant effect on the air quality of the area.

Similarly, no significant air quality impacts are anticipated from the continued operation of the existing sanitary landfill at TEAD-S.

Some particulate emissions may result from the operation of a spoil area located along the northern boundary of TEAD-S, but no significant air quality impact should result.

Mobile-source pollution at TEAD-S consists of some private and base personnel commuter transportation and on-site movement of vehicles. Depot vehicles have emissions control devices and are frequently replaced with more efficient units.

There are no significant odor impacts resulting from South Area activity, though the sewage lagoon and the landfill have the potential for producing odors if they are improperly operated. No odor-producing operations are anticipated by the Master Plan. Solid waste from the South Area will be transported to the planned solid waste incinerator in the North Area. This will reduce landfill requirements and potential odors in the South Area.

## 5.2 Depot Closure

The closure of TEAD would eliminate the impacts on air quality in the area resulting from current and planned operations in the North Area and the South Area.

At TEAD-N an estimated total of 352 tons per year of particulates and SO<sub>2</sub>, NO<sub>x</sub>, HC, and CO emissions would be eliminated. Negligible impacts might continue should a portion of any volatile fuels remain in storage. The discontinuation of irrigation in some improved areas might increase dust problems.

The closure of TEAD-S would eliminate the majority of air pollution sources. Base closure might not include the movement and re-storage of chemical munitions, and continued monitoring of air quality by ASLNET might be required. Negligible impacts might continue should a portion of any volatile fuels remain in storage. Also the discontinuation of irrigation might add to the dust problem in the area. Generally, base closure would result in a positive and beneficial impact to the ambient air quality of the area.

Depot closure would also eliminate the potential for odors at both TEAD-N and TEAD-S.

## 6. Water

### 6.1 Water Resources

#### a. Continued Depot Operation

##### North Area

During rare periods of heavy rains or rapid melt of mountain snowpacks, surface water flows on TEAD-N in Box Elder Wash and South Willow Creek, both of which cross the Depot near its western boundaries.<sup>121</sup> However, natural surface waters do not normally occur on North Depot land.

Storm water runoff flows locally toward lower elevations, generally toward the north. There are no flood hazard areas on TEAD-N, although Box Elder Wash does possess a potential for occasional flash flooding.

Although a shallow perched water table probably occurs under portions of TEAD-N, the primary water supply is obtained from deeper, unconfined aquifers at depths ranging from 380 to 630 feet. The one exception is a stock well located near the center of the Depot where the static water level is 240 feet. The movement of ground water underlying TEAD-N is in a north/northwesterly direction.

The main source of recharge for the aquifers underlying the Depot is subsurface flow from the Oquirrh Mountains to the east. Other significant sources of recharge include subsurface flows from the Stansbury Mountains and Rush Valley.<sup>122</sup> The main source of discharge of the underlying aquifer is TEAD-N wells, which probably account for 90% of the total discharge.

Activities at TEAD-N have resulted in the creation of several man-made surface water bodies, including a sewage lagoon, an industrial waste lagoon, and several small holding and evaporation ponds. These areas cover less than 20 acres. Although they account for all of the surface water normally on the Depot, they can be considered as "special use" and have no impact.

TEAD-N does control a small dam (the Ethiopian Dam) and flood gates located in Box Elder Wash. Although not presently in use, the purpose of the dam and flood gates is to dissipate the energy in the occasional "flood" waters which flow in Box Elder Wash during rapid snowmelt or heavy rains. Discussions have been conducted with the State of Utah to decide responsibility for operation and maintenance of the dam and flood gates, but no agreement has yet been reached. The impact of not using the Ethiopian Dam range from slight to moderate, depending on annual climatic conditions. Minor infrequent flooding and road damage have occurred in the past, both on and off the Depot. Therefore, regular use and maintenance of the Ethiopian Dam should have beneficial impacts.

There are no activities in the Master Plan which will impact upon surface waters. While not a portion of the Master Plan, an 80-acre irrigation reservoir is presently being designed for construction during the summer of 1982. Although not located on the Depot proper, it will be located on South Willow Creek (NE 1/4, Section 23, Township 3 South, Range 6 West) adjacent to the Depot and partially on lands controlled by TEAD.<sup>123</sup> This reservoir will hold water only temporarily during the summer and will have no impact on the Depot.

Six wells are located on TEAD-N as shown in Table 65. During 1981 water use on TEAD-N was 325,296,000 gallons, including 324,936,000 gallons from wells 1 through 4 and 360,000 gallons from wells 5 and 6.<sup>124</sup> Water usage during 1981 was approximately 5% higher than during 1980. Domestic water use on TEAD-N accounts for approximately 17% of the total usage; industrial use accounts for the remainder.<sup>125</sup>

TABLE 65  
NORTH AREA WELL DATA

<u>No.</u>	<u>Depth (ft.)</u>	<u>Static Water Level (ft.)</u>	<u>1980 Tested Capacity (gpm)</u>	<u>Remarks</u>
1	763	367	400	Main distribution system
2	500	382	550	Main distribution system
3	700	357	460	Main distribution system
4	780	624	34 <sup>1</sup>	Isolated distribution system; ammunition demolition area
5	660	623	25 <sup>1</sup>	Irregular use; firing range
6	428	240	7 <sup>1</sup>	Irregular use; stock watering trough

Note:

<sup>1</sup>Rated capacity.

Source: Utah State Department of Natural Resources, Division of Water Rights; and Tooele Army Depot.

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Although the quantity of groundwater available in Tooele Valley is unknown, impacts created by Depot use appear to be minor and TEAD facilities engineers have estimated the use could be more than doubled without permanent impacts to groundwater levels.<sup>126</sup>

Other data also indicates that impacts are minor. Approximately 40% (28,000 acre-feet) of the total annual discharge is by wells; the remainder is loss from springs, evapotranspiration, and outflow to the Great Salt Lake. Most of the discharge by wells (approximately 85%) is used for irrigation, leaving approximately 4,200 acre-feet for other uses.<sup>127</sup> Therefore, although TEAD-N accounts for approximately 24% of the remaining water use, it accounts for only 4% of the total water use within Tooele Valley.

There are no activities listed in the Master Plan which will increase water use appreciably.

#### South Area

The only natural surface waters normally occurring on TEAD-S are those in Ophir Creek where it enters the Depot near its northeastern boundary, but water in this creek may be extremely limited or nonexistent during dry periods. Both West Dip Gulch and Mercur Creek contain water during periods of heavy rainfall or rapid melt of mountain snowpack. Storm water runoff flows generally toward the southwest.

Occasional flooding occurs on some portions of TEAD-S. During rare periods of intense rainfall or rapid snowmelt, flood waters enter the Depot from West Dip Gulch and Mercur Creek. In the past, these waters have spread out over large uninhabited areas; carving gullies and depositing boulders, rocks, and debris. Low areas in the southwestern portions of the Depot have also been flooded occasionally by extensive storm waters moving northward across the valley.<sup>128</sup>

The ground water divide in Rush Valley near bisects the Depot, running from the northeast to the southwest boundaries, as shown on the map on page 53. Ground water to the north of this line flows westerly toward the valley center, and then northerly. Ground water to the south of this line flows southeasterly.

The primary water supply for TEAD-S is obtained from an unconfined aquifer 280 to 290 feet below the Depot. The two wells drawing water from this aquifer are located on an alluvial fan below Ophir Canyon. It is thought that confined (artesian) conditions occur in the lower slopes of this fan and in the valley lowlands, but a well drilling operation during 1972 in this area encountered an unconfined aquifer.

The aquifer(s) underlying TEAD-S is recharged primarily by subsurface flow from the Oquirrh Mountains to the northeast. Discharge occurs as a result of water use on the Depot, but the existence of a significant number of phreatophytes (plants which use ground water resources) and areas of bare ground in the southwestern portions of the Depot indicates an additional discharge through evapotranspiration.<sup>129</sup>

A 1.4-acre sewage overflow lagoon has been constructed in the northeastern portion of TEAD-S. This is a special-use facility and has no impact except to create a small surface water body.

There are no activities in the Master Plan which will impact surface waters at TEAD-S.

While two wells draw water from the aquifer, there are actually three wells located on TEAD-S, as shown in Table 66. Water from well No. 3 contains a suspended silt and is unpotable. This well is not normally used, but is held in reserve to supply additional water for fire fighting.

TABLE 66  
SOUTH AREA WELL DATA

<u>No.</u>	<u>Depth (ft.)</u>	<u>Static Water Level (ft.)</u>	<u>1980 Tested Capacity (gpm)</u>	<u>Remarks</u>
1	405	285	317	Main distribution system
2	428	284	317	Main distribution system
3	550	30	122 <sup>1</sup>	Water unpotable

Note:  
<sup>1</sup>Rated capacity.

Source: Utah State Department of Natural Resources, Division of Water Rights; and Tooele Army Depot.

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Water use on TEAD-S during 1981 was 137,205,000 gallons.<sup>130</sup> This was approximately 30% higher than during 1980, but future water usage should decrease to or near the 1980 level of 106,277,000 gallons. The higher water usage during 1981 appears to be the result of the continuous running of a pump for five to six months due to failure of the automatic control system. Domestic water use on TEAD-N accounts for approximately 10% of the total usage; industrial uses account for the remainder.<sup>131</sup>

TEAD facilities engineers have estimated that TEAD-S could use up to 422 acre-feet annually before seriously impacting aquifer water levels.<sup>132</sup> Based on a 1980 water usage of 327 acre-feet, TEAD-S is 30% below this impact level. The higher water use during 1981 indicates that a substantial but temporary impact on aquifer water levels may have occurred.

Existing data for water use within Rush Valley is quite old, but it appears that the primary use for water from wells is for irrigation. Based on 1969 water use data, TEAD-S uses approximately 7% of the total water withdrawn from groundwater resources in the valley. Present impacts by TEAD-S upon groundwater resources in Rush Valley are thus minor, and there are not activities listed in the Master Plan which will appreciably increase water use.

#### b. Depot Closure

Closure of the Depot would eliminate the permanent man-made surface water bodies at TEAD-N and TEAD-S, through controlled removal or evaporation. Unless filled or covered, these areas would, however, continue to hold temporary surface waters from precipitation. Unless responsibility for control and maintenance of the Ethiopian Dam at TEAD-N were turned over to another governmental agency, infrequent flooding could be expected to occur as a result of flood waters in Box Elder Wash.

Depot closure would eliminate further Depot impacts on groundwater resources of Tooele and Rush valleys.

### 6.2 Water Quality

#### a. Continued Depot Operation

##### North Area

TEAD-N has experienced insignificant changes in water quality. The water is periodically sampled and tested by the U.S. Army Department of Environmental Hygiene and the State of Utah Department of Health, Division of Environmental Health. The most recent testing was conducted in July and August of 1980, with previous reporting in February of 1977. During each of these periods, wells No. 1 and No. 3 located in the southeast corner of the Depot experienced dissolved solids concentrations in excess of Federal Drinking Water Standards. Dissolved solids concentrations ranged from 712 to 962 mg/l in July of 1980 and 637 to 1,132 mg/l in December of 1980. Well No. 1 also experienced concentrations of chlorides in 1977 and 1980 above the 250 mg/l standard. Associated with increased dissolved solids concentrations were increased in calcium, boron, sulfates, and sodium, although not in excess of recommended standards. Table 67 summarizes the water quality of wells No. 1, and No. 2, and No. 3 which are the major sources of water at TEAD-N, for the 1977 and 1980 testing periods. Dissolved solids concentrations are shown graphically on the map on page 57.

The potential for water quality contamination exists on TEAD-N primarily as a result of maintenance and repair activities. Grease, oil, solvents, and heavy metals are washed into the area's storm sewer system and discharged to open drainage ditches. The drainage ditches are unlined and the high percolation capability of the soils might eventually impact Tooele Valley's groundwater quality. Subsection F of Section I describes the quantity, quality, and location of these operations.

TABLE 67  
WATER QUALITY - NORTH AREA  
(in mg/l)

Component	July 15, 1980 <sup>1</sup>			February 28, 1977 <sup>2</sup>		
	Well No. 1	Well No. 2	Well No. 3	Well No. 1	Well No. 2	Well No. 3
Calcium	148	50	100	171	57	91
Potassium	7	2	5	6.2	--	3.8
Silica	22	14	25	24	13	26
Boron	190	75	170	410	200	230
Copper	.010	.001	.01	--	--	--
Iron	2.18	.04	.33	--	--	--
Magnesium	56	18	36	71	19	35
Manganese	.01	.01	.01	.02	.02	.02
Chlorides	295 <sup>3</sup>	53	210	378 <sup>3</sup>	49	197
Sulfates	185	23	91	235	27	86
Arsenic	.004	.001	.003	--	--	--
Barium	.05	.05	.06	--	--	--
Cadmium	.001	.001	.001	--	--	--
Chromium	.005	.005	.005	--	--	--
Fluorides	.24	.11	.21	.2	.1	.2
Lead	.015	.01	.01	--	--	--
Mercury	.0001	.0001	.0001	--	--	--
Nitrates	2.9	2.55	2.45	--	--	--
Silver	.002	.002	.002	--	--	--
Sodium	87	39	82	115	42	98
Total dissolved solids	962 <sup>3</sup>	300	712 <sup>3</sup>	--	--	--

Notes:

<sup>1</sup>Utah State Department of Health, Salt Lake City Water Analysis, Dan B121C.

<sup>2</sup>Groundwater Conditions in Tooele Valley, Utah; 1976-78, Tech. Pub. #69, DNR; 1981.

<sup>3</sup>Exceeds standard.

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An industrial waste holding pond was constructed to retain and dispose of the possible contaminants. No information is available regarding the size of the facility. Assuming average daily flows of 67,345 gallons per day,<sup>133</sup> a one-quarter-inch-per-day infiltration rate, and 30 inches per year net evaporation (evaporation minus rainfall); approximately 5.5 acres of water surface would be required to dispose of the wastes. The holding pond concentrates wastes, allowing solids to settle and grease and oils to float on the surface. To date no provisions are available for removal and disposal of the floatables.

The infiltration of contaminated wastes might also eventually impact groundwater quality on and off the base. The impact on the aquifer(s) and existing wells is unknown at present. A recent study <sup>134</sup> recommended the further analysis and evaluation of this potential problem. Monitoring wells are to be installed in early 1982; samples are to be collected and analyzed and a final report should be available in mid-1982.

The Master Plan for TEAD-N includes the construction of an Engineering Equipment Diagnostic and Storage Facility and a Radiator/Fuel Tank Repair Addition. Both facilities are expected to increase productivity--the former by 10% and the latter by 20%. This increase may result in an associated increase in industrial waste production. Additionally the Engineering Equipment Diagnostic and Storage Facility will consolidate steam cleaning, inspection, storage, and administration activities, which may result in a concentration of waste production.

Storm water containing oils, grease, fertilizer, etc. is collected by means of a storm sewer and discharged at an outfall located at the southeast corner of the existing sanitary landfill. The discharge is unretained and percolates into the surrounding soil. Although flows are intermittent throughout the year, these wastes in accumulation with other discharges at the Depot may eventually impact groundwater quality.

There is evidence from estimated sewage flows and recorded flows at the sewage lagoon that pipe making up the storm and sanitary sewer system experiences exfiltration. These flows are small (estimated at 15% of flow) and spread over miles of installed pipe. The exfiltration and percolation of these wastes should have insignificant effects on the groundwater quality at TEAD-N.

The existing sewage treatment lagoon at TEAD-N treats and disposes of domestic wastewater. The amount of sewage treated and disposed of varies. Flows as high as 164,733 gallons per day have been recorded, but generally average daily flows are approximately 90,000 gallons. Treatment is by means of stabilization and normally consists of an anaerobic and aerobic process. Oxygen for aerobic stabilization in the surface layer is provided by photosynthesis and surface reaeration, while sludge in the bottom layer is anaerobically digested. The reduction of BOD<sub>5</sub> and suspended solids concentrations ranges from 70% to 95%.

Percolation and net evaporation provide for the disposal of the effluent. Approximately 75% of the effluent infiltrates into the soil, based on an allowable rate of one-quarter inch per day. The effluent may contain suspended solids, nitrates, phosphorous, and pathogenic organisms among other

things. The suspended solids and pathogenic organisms are taken up by the upper soil. The movement and effects of nitrates and phosphorous are less predictable and these substances may eventually reach the aquifer(s). Assuming 90,000 gallons per day, approximately 30 pounds per day or 10,950 pounds per year of nitrates are added to the soil. This amounts to a loading of 0.44 pounds per acre per year, which is considered insignificant.

Several small holding, evaporation, and disposal ponds are listed and discussed in subsection F of Section I. These facilities are randomly located throughout the Depot and provide a method of collecting and disposing of miscellaneous liquid wastes. These wastes include rinse water, x-ray developer, wash-down wastes, and previous industrial wastes.

Generally these facilities provide for "primary" treatment. Solids are allowed to settle, some stabilization occurs, and the effluent is disposed of. Disposal methods vary and include percolation and evaporation. Percolation of effluent presents a potential impact in the event that contaminants migrate into the existing aquifer. Disposal by evaporation eliminates infiltration of contaminants but requires greater land area. Net evaporation capacities at TEAD-N are estimated at only 25% of the total disposal rate (net evaporation plus 1/4 inch per day infiltration). A residue results from complete evaporation, which may require disposal at an approved landfill site. Although a potential impact exists, the negligible size and small number of industrial waste ponds should not have any significant impact on the water quality of Tooele Valley and the North Area.

Isolated areas of TEAD-N must rely on septic tank/drainfield systems for treatment and disposal of domestic wastewater. Effluent from the septic tank is discharged to perforated or open joint piping (drainfield). Disposal is by means of percolation and evapotranspiration. The quality of effluent received by the soil varies but includes among other things suspended solids, nitrates, phosphorous, and pathogenic organisms. The low and intermittent flows and lack of density and number should cause no significant impact to the groundwater quality in the area. Additional septic tank/drainfield systems will be required as part of the Master Plan, but these new installations will also have no significant impact on the water quality of the area.

The sanitary landfill at TEAD-N provides a procedure for the sanitary disposal of rubble, debris, and putrescible materials. Normal operations involve the hauling, dumping, compaction, and covering of solid wastes. Approximately 300 pounds of soil are required to cover one cubic yard of waste (approximately 750 pounds). Daily disposals at the North Area installation are estimated at seven tons per day requiring approximately two 10-yard dump trucks.

A major drainage swale runs along the axis of the landfill, flowing in a northerly direction. Storm water runoff could transport and concentrate contaminated wastes, eventually infiltrating the soils located downstream.

Past operations and the nature of activities at the North Area have raised a question as to the type and quantity of materials disposed of at the sanitary landfill. North Depot activities may have the potential to significantly impact the area's water quality. This subject requires further

evaluation and possible installation of a monitoring program to anticipate future problems. Monitoring wells have been installed to sample and test potable water supplies for possible contamination.

The installation of a 32-ton-per-day solid waste incinerator is planned for the North Area. The incinerator will produce from 10 to 90 pounds per ton of refuse and 40 to 350 gallons per day of "quench" water. This water will have a high pH (6 to 11.8) and contain suspended and dissolved solids (6 to 10 grams per kilogram of water). Quench water will require proper disposal; however, due to the small quantity involved, it will not have any significant impact on water quality.

The incinerator will also produce a residue containing silicon, aluminum, calcium, and iron oxides. The leachate from this residue will have a high hardness but should result in no significant impact on existing water quality.

The existing water transmission and distribution system at TEAD-N has experienced numerous breakage problems. Several of the resulting leaks have gone undetected due to the high percolation capacity of the soil. A potential contamination of the potable water supply exists should a line transversing a contaminated area leak and a back pressure occur. A back pressure may cause contaminants to be sucked into the system. Care should be taken to provide a thorough maintenance program for all pipes where these conditions may exist.

TEAD-N provides no method of treating existing water supplies. Deep wells pump groundwater directly to distribution or storage facilities. Chlorination is provided at the individual well heads where chlorine is added in concentrations of five parts per million.

#### South Area

The water from public supply wells at TEAD-S has, in the past, experienced significant water quality changes. Dissolved solids concentrations and the relative concentration of individual constituents have fluctuated. Relative concentrations of chloride have increased with increased concentrations of dissolved solids. Sulfate plus nitrate and magnesium have remained approximately the same as the relative concentration of bicarbonate has decreased. Relative concentrations of sodium plus potassium have increased while calcium has decreased with increased concentrations of dissolved solids up to 460 mg/l. As the dissolved solids concentration increased from 460 to 497 mg/l, sodium plus potassium decreased and calcium concentrations increased.

The two operating wells at TEAD-S are located a quarter of a mile from Ophir Creek, within its alluvial fan. There is a possibility that the water quality of Ophir Creek has an impact on these wells. The dissolved solids concentration of Ophir Creek is approximately 240 ppm lower than water at the installation (see the map on page 58). During periods of high discharge from Ophir Creek (February to June) and reduced withdrawal from the wells, the water at TEAD-S shows a lower dissolved solids concentration. Conversely, during the August to November period, higher dissolved solids concentrations apparently result from decreased recharge from Ophir Creek and increased withdrawal at TEAD-S. Water levels generally decline during this period with

the increase in pumping, resulting in larger contributions of water stored deeper in unconsolidated rocks. The deeper water apparently contains more dissolved solids than the water that is contributed directly from Ophir Creek.

Sampling and testing procedures at TEAD-S are conducted in the same manner and by the same agencies as at TEAD-N. The most recent data is available from the 1977 and 1980 testing periods. The 1977 testing was conducted in February during low well withdrawal and increased recharge. In 1980 testing was conducted in July with increased withdrawal and low recharge. Prior to this, some testing was conducted throughout 1974. During higher than recommended levels. In 1974 total dissolved solids were greater than 2,000 mg/l. The most recent testing of 1980 show all principal constituents within maximum contaminant and recommended levels, including manganese, chloride, and sulfate. During 1977, results also showed chromium concentrations in excess of the .05 mg/l maximum level, but these concentrations were within the limits during the 1980 sampling. The analytical results of the 1977 and 1980 testing are shown in Table 68.

TABLE 68  
WATER QUALITY - SOUTH AREA  
(in mg/l)

<u>Component</u>	<u>July 15, 19801</u>		<u>February 28, 19772</u>
	<u>Well No. 1</u>	<u>Well No. 2</u>	<u>Well No. 1 and 2</u>
Calcium	58	58	57-91
Potassium	1	1	1-3.8
Silica	11	11	13-26.7
Boron	.135	.135	0-.28
Copper	.01	.015	.02-.2
Iron	.07	.30	.05-.6
Magnesium	28	24	19-35.2
Manganese	.01	.01	.02-.2
Chlorides	12	21	49-197
Sulfates	34	35	27-286
Arsenic	.001	.001	.1
Barium	.05	.05	0
Cadmium	.001	.001	.01
Chromium	.005	.005	.2
Fluorides	.07	.08	.1-.5
Lead	.01	.01	.1
Mercury	--	--	.004
Nitrates	2.45	1.8	2.3
Silver	.002	.002	.1
Sodium	9	11	42-98
Total dissolved solids	302	280	--
pH	8.0	8.1	--

Source: State of Utah, Department of Health, Water Analyses; and "Analysis of Existing Facilities/EAR, TEAD South Area," May, 1981.

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Subsection F of Section I describes in detail what data is available regarding the burial and disposal of hazardous waste at TEAD-S. The majority of these wastes are located along the southern boundary of the installation. Incomplete information is available with respect to the type of materials disposed of, their quantity, their exact location, and the method of demilitarization (if any) used in their disposal. A potential impact to groundwater quality exists in this area. Without proper demilitarization, containers of these materials (mustard bombs, thermite, W. P. grenades, etc.) will eventually decompose. Hazardous waste will be released which may eventually find its way to the underlying aquifers (shallow or deep).

In 1980 a 250-foot by 250-foot evaporation/seepage lagoon was constructed to handle the effluent from the Imhoff tank at TEAD-S. Prior to this, effluent was discharged directly to the soil. Based on an existing population equivalent of 150 and 100 gallons per P.E. per day, the Imhoff tank presently treats approximately 15,000 gallons per day. The tank is equipped with a pump for cleaning operations. The lagoon operates in the same manner as the sewage lagoon located at TEAD-N. Wastes are stabilized and receive treatment of 70% to 95% removal of suspended solids and Biochemical Oxygen Demand. Periodically, accumulated sludge is removed and buried on the installation.

Typically, Imhoff tanks provide a 50% removal of BOD<sub>5</sub> and suspended solids. Assuming 0.2 pounds per day per P.E. for both BOD<sub>5</sub> and suspended solids, the effluent lagoon receives approximately 15 pounds per day of suspended solids and BOD<sub>5</sub>. The effluent also includes nutrients (nitrates and phosphorous) and pathogenic organisms. Biologically the facility is loaded at approximately 10.5 pounds BOD per acre per day, which is well within acceptable design standards. Nitrate loading for the lagoon is calculated at 5.0 pounds per day or 1,825 pounds per year, which is insignificant on a per-acre basis.

Assuming an allowable seepage rate of 0.25 inch per day and a net evaporation rate of 30 inches per year, the lagoon's capacity is estimated at a population equivalent of 130. Since this value exceeds the P.E. of 150 now at TEAD-S, seepage rates are in excess of 0.25 inch per day. Nonetheless, the facility should have no adverse impacts. This includes the sludge produced in the Imhoff tank, assuming that proper burial procedures are followed.

Open drainage ditches and swales provide storm water collection and disposal at the South Area. The run-off from the administration area, storage area, and CAMDS area is all handled in this manner. The ditches and swales are unlined and allow the even distribution and disposal of stormwater. Grease, oil, and solvents are washed into the system during storms. Grassy channels assimilate a portion of these pollutants and the ditches and swales prevent concentration infiltration of the wastewater. Under normal conditions the impact of storm water infiltration will have no significant impact.

Isolated areas of TEAD-S must utilize septic tank/drainfield systems to treat and dispose of domestic sewage. However, these installations have no significant impact on South Area water quality.

The South Area contains two sanitary landfills. An abandoned landfill is located southwest of the warehouse area. The active landfill is located east

of the warehouse area, adjacent to an existing fence line. The potential impacts of these facilities are similar to those discussed previously for the North Area sanitary landfill.

b. Depot Closure

North Area

Little data is presently available regarding the actual impacts associated with industrial waste discharge at TEAD-N. The current monitoring program should provide more precise information. Beyond this, even less is known of the residual effects or life of any contaminant that may remain should the Depot close. Contaminants may be taken up by plant life, be held in suspension by the soil, be diluted and undetectable, or eventually infiltrate the soil. Certainly the discharge would terminate and stabilization begin if the installation were closed.

With Depot closure, storm water discharge from the administration area would also cease, resulting in a slightly beneficial impact.

Although sewer exfiltration would cease following Depot closure, small areas containing undesirable materials would be subject to gradual assimilation. No significant impacts would be expected, however, due to the small quantities involved.

Depot closure would result in the evaporation of the liquid portion of the sanitary sewage lagoon. A thickened sludge would remain which could be covered with the lagoon levees. The sludge is rich in nutrients (nitrates and phosphorous) but would have no impact on water quality at TEAD-N.

The evaporation of all liquids in miscellaneous ponds at TEAD-N would leave a solid residual in the event of base closure. Such residuals could be documented and buried with no significant impact.

Drainfields would be abandoned in the event of Depot closure, which would have no impact on water quality.

The potentially significant impact resulting from sanitary landfill operations would be affected by the closure of the installation. Future effects of past operations could require long-term monitoring. The conditions existing at the time of closure would require time for stabilization.

Depot closure would preclude the construction of the planned solid waste incinerator and eliminate any potential impacts of this facility on water quality.

The possibility of supply contamination through water line leakage would cease to be a concern at TEAD-N with Depot closure. Water lines would be abandoned. Well locations would be noted, pumps removed, well casing properly capped or, if required by state or local health officials, proper procedures followed for abandonment of water wells. Water storage tanks would require drainage and would be secured from nuisance. These procedures would not have any significant impacts on water quality.

## South Area

The potential impact on water quality resulting from contaminated areas at TEAD-S would present a particular problem in the event of the base closure. The contaminated areas would have to be periodically monitored and secured from accessibility. The unknown of the area make it impossible to predict impacts on water quality.

Abandonment of the existing Imhoff tank would include draining and final sludge disposal. The tank would probably be destroyed and filled with soil. The levees of the effluent lagoon could be used to fill the facility and minor site grading would return the site to its natural topography. No significant impacts would result from these procedures.

Depot closure would have no significant impacts on the storm water drainage system at TEAD-S.

Normally the abandonment of septic tanks requires the removal of filling of the structures. Drainfields need only be abandoned. At a minimum the location and size of the system should be recorded for future reference. No impacts should result from the discontinued use of a septic tank/drainfield system.

The abandoned and operating sanitary landfills at TEAD-S would require long-term monitoring in the event of Depot closure. The potential for future impacts from past use of these facilities would remain.

## 7. Flora

### 7.1 Continued Depot Operation

#### a. North Area

The plant species of Tooele Army Depot North have adapted to not dry summers, cool springs and falls, and mild winters. They have also adapted to an eroded soil; some have adapted to alkaline soils.

A list of floral species likely to be found on the Depot is provided in Appendix B. This list has been compiled through research done on the surrounding area, inference, and a brief survey of the base. The data provided in the Depot's Land Management Plan (1975) and 1980 environment assessment was used as a base. The map on the following page shows the general distribution of vegetation types on the North Depot, provides a general indication of the impacts of Depot activities, and identifies the fauna associated with the vegetation.

Fungi on TEAD-N have not been studied. However, 114 species have been reported in the vicinity at Dugway Proving Ground. Fungi play a large role in decomposition.<sup>135</sup>

Lichens and soil algae play an important role in the soil due to the sparsity of vegetation in some areas. There are 26 species in the vicinity.<sup>136</sup> Chara is the only species of algae identified in the open water (sewage lagoon) of TEAD-N, but there are probably more.<sup>137</sup>



Eighteen species of mosses have been identified at Dugway in moist situations. There may be some moss activity at TEAD-N, but it is limited to open water areas (sewage lagoon).<sup>136</sup> No ferns have been found at TEAD-N.

The seed plants are the most obvious floral species and are utilized by the native animal and livestock populations. They also comprise the bulk of the pests, weeds, and other undesirable species. Two hundred ninety-eight species from 51 families are reported in the vicinity of Dugway Proving Ground.<sup>139</sup> It is not known how many species there are at TEAD. Major vegetation types are juniper (Conifer) and Mormon tea (Ephedra). The rest of the dominant plants belong to the goosefoot (Chenopodiaceae), grasses (Gramineae), or sunflower (Asteraceae) families. The goosefoots are represented by fourwing saltbrush, shadscale, winterfat, gray Molly, greasewood, Russian thistle, inkweed, and halogeton. The sunflowers are represented by sagebrush, rabbitbrush, and horsebrush. The grasses are represented by crested wheatgrass, bluebunch wheatgrass, cheatgrass, saltgrass, Indian ricegrass, sand dropseed, wheat, needle and thread grass, alkali sacaton, and six-week fescue. Livestock overgrazing favors the shrubs at the expense of the grasses. This is especially true of pig sagebrush, which is unpalatable to livestock.<sup>140</sup>

Succession on the Depot is a reverse one--from climax grass-browse to juniper and a grassland, to sagebrush and shadscale. On about 27% of the Depot, sagebrush has become very thick due to its dual root system. It has a tap root that allows it to draw moisture from deeper soils, and an extensive system of shallow roots competes directly with herbaceous species for moisture. Sagebrush can remain physiologically active during the hot dry summers.

Sagebrush performs many functions on the Depot: it protects perennial grasses and forbs; it bolsters the nutrient cycle in the summer when herbaceous plants are aestivating; it increases the rate and depth of nutrient cycling; it provides cover for birds and other animals; it provides burrowing areas for rodents; it promotes a uniform accumulation of snow and prevents drifting; and it delays the melting of snow, extending the period of usable soil. The elimination of sagebrush on the Depot has a moderate impact on species diversity.

Perennials are the most important group of plants on the Depot. Their roots remain in the soil binding it and preventing erosion. The vegetative portions of many of the perennials remain after the growing season has ended and provide forage for animals and livestock during that period. Some dominant examples are bud sage, big sagebrush, juniper, common yarrow, desert saltgrass, bluebunch wheatgrass, native bluegrass, and Indian ricegrass. Perennials produce most of the desert flowers after spring rains.<sup>141</sup>

TEAD-N has and is still removing some perennial species and replacing them with others. Indirect and cumulative impacts such as grazing and some construction encourage the depletion of herbaceous perennials and the expansion of woody perennials and some annuals. The impacts are slight to moderate.

Annuals produce more cereal food than the perennials. Seed production is high because the annuals must reproduce within a growing season. Many of the cereal and some grass plants are annuals. Examples of annuals are halogeton, alkali sacaton, Russian thistle, fancy mustard, cheatgrass, peppergrass, spiked wheatgrass, matchbrush, and wheat. Annuals tend to spread relatively quickly.

TEAD-N has no timber resources. There are junipers on the Depot, but they are small and only suitable for firewood or fence posts.

The North Depot has no known rare, threatened, or endangered species of plants and no significant plant diseases.

Grazing on the land now occupied by TEAD-N has had a substantial impact on the Depot's floral communities. Grazing of the herbaceous plant community alters the plant composition in favor of big sage. This is basically what happened in virtually all of the habitats when the Depot land was overgrazed; desirable plants were eaten before they could reproduce or obtain sufficient growth to withstand the summer drought. The downward trend stopped in the mid-1900s but recovery is very slow. In fact, due to the serial content of the soil and removal of water for irrigation and housing, the original grass-forb and grassland climax habitat will probably not reoccur. Much of the land has been mechanically or chemically cleared and spiked, crested, and western wheatgrass have been planted. These grasses hold the soil but are being invaded by sagebrush cheatgrass, and their associated vegetation.<sup>143</sup>

Floral productivity on the Depot has decreased and is low now due to overgrazing, which has resulted in an increase in runoff, evaporation, and soil moisture losses; replacement of more desirable plant species with less desirable species; major losses of soil by water and wind erosion; major changes in the flora and fauna of the soil; and major disruptions in the nutrient cycles. These changes in soil and plant conditions, in turn, have reduced the ability of the land to support animal life.<sup>144</sup>

Controlled grazing (4,500 animal unit months (AUMs) on approximately 20,045 acres from November 1 to May 31) is permitted on the Depot at present. The Commander can decide how many AUMs will be permitted, determined by the range condition.<sup>145</sup> Livestock are fenced out of the industrial waste lagoon and sanitary landfill. The industrial waste outfalls will also be fenced in 1982 to prevent grazing on contaminated vegetation.

Selective grazing for grasses and forbs has and will continue to favor the growth and spread of the less palatable woody perennials, such as sagebrush and shadscale. The herbaceous perennials and some summer annuals are grazed when sprouting, placing them at a disadvantage for maturation and reproduction. A grazing climax has been reached on much of the Depot.

An indirect impact of grazing is the invasion of cheatgrass, a winter annual. Invasion of cheatgrass is possible due to the lack or weakened condition of native perennial grasses and forbs. Cheatgrass outcompetes the perennials and summer annuals by germinating in the fall and overwintering as a sprout. In the spring it has a head start on the rest of the vegetation and flowers much earlier. Cheatgrass also develops an extensive root system which allows efficient uptake of water.

Another impact of grazing is the alteration of nutrient cycles. Grazing livestock eat plants on the Depot, taking up the nutrients, and then are taken away for slaughter. Some of the nutrients are replaced by the livestock's manure and urine, but a significant portion is being removed. The cumulative effects are the reduction of vegetative litter, soil water holding capacity, and soil fertility.

Operation of TEAD-N also involves a variety of activities that contaminate portions of the base. Contaminated areas are shown on the map on page 31. Some of these areas have a beneficial impact on the Depot's flora. For example, drainfields supply nutrients and water encouraging growth. In addition, the sewage lagoon is a critical habit growing various species of hydrophytic plants. This is a productive areas on te Depot, cycling many nutrients back into the soil and food chain.

Most of the contaminated areas, however, have adverse impacts on the Depot's vegetation. Areas with relatively slight adverse impacts include the holding/evaporation pond and X-ray facility, the cement settling tank with four lined percolation and evaporation ponds, the laundry and shower area, the shallow pond, the gravel-lined pond, the storm sewer outfall, and the demolition and burning ground areas. In most of these areas there is some possibility that the flora will take up some contaminated substance, passing it through the food chain.

In the case of the sanitary landfill and the open channel outfalls and holding pond, the impact is moderate to severe. The sanitary landfill is possible leading to plant uptake of heavy metals, PCB, and zince chromate, concentrating these substances in the food chain. The open channel outfalls and holding pond may be causing th uptake of heavy metals, acids, caustics, detergents, oils, and suspended solids, possibly concentrating these substances.

Buildings and other structures on TEAD-N have also impacted Depot flora. The areas around these facilities which are disturbed during construction and not landscaped are subject to invasion by "weeds" such as Russian thistle and cheatgrass. More importantly, the areas around the administration and housing buildings have been planted in trees, shrubs, and Kentucky bluegrass. The planting and watering of these non-native species for shade, wind control, and aesthetics have created a new floral community on TEAD-N. A list of the species planted on the installation is provided in Appendix B.

Paving covers approximately 1.5% of the North Depot. Paved surfaces tend to destroy soil productivity as many of the soil organisms eventually die off and soil atmosphere and moisture are removed. However, the amount of paving is small and it has only a slight impact on Depot flora.

Firebreaks, unpaved road, railroads, and perimeter fence areas also represent altered vegetation. The areas have been mechanically altered and remain altered chemically. Herbicides are sprayed on these areas to prevent revegetation. However, Russian thistle, cheatgrass, gumweed, and other species invade anyway, creating a successional start for revegetation. These areas (and the paved roads) represent barriers not only for fire but for plant dissemination as well. The barriers not insurmountable, however, as seeds may be transmitted by air or animal vectors. These areas are also potential wind erosion sites.

The vegetation in the igloo and open revetment areas at TEAD-N have also been impacted by Depot operation. These areas were mechanically disturbed, removing the existing vegetation and wildlife. They were then reseeded in wheatgrasses. Later some perennial plants reinvaded the area. Approximately every 15 years the igloo area is overcovered and reseeded, preventing a return to a grazing climax.

Reserve summer training camps, which vary in size, have a slight to moderate impact on the Depot's flora. The reserves perform maneuvers disturbing or eliminating existing flora. Recovery time is very slow and vehicular and personnel damage remains for considerable periods. Invasion by undesirable flora (Russian thistle and cheatgrass) is an indirect impact of disturbance.

Implementation of the Master Plan will do little to change the impact of operation of the facility on the vegetation of TEAD-N. The replacement of buildings will result in minor impacts in terms of eliminating small patches of flora from building sites and possibly revegetating other areas. Additional planting of non-native species can also be expected. In addition, the construction of the proposed solid waste incinerator will eliminate a substantial majority of the solid wastes currently going into the Depot's landfill, which will mitigate the floral impacts of landfilling sanitary wastes. However, the primary impact from operation of the landfill results from heavy metals, PCB, and zinc chromate, which will not be affected by the new incinerator.

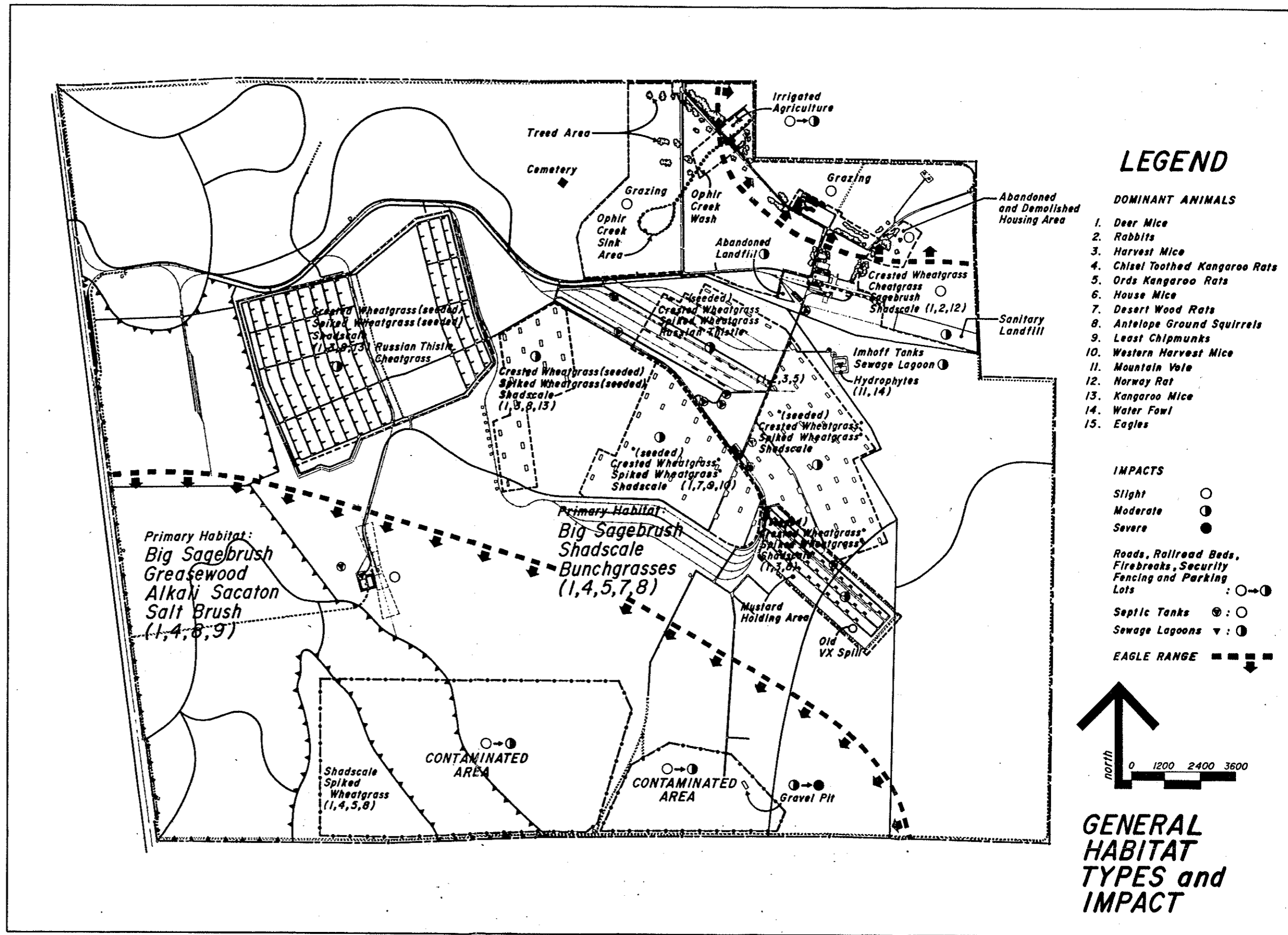
#### b. South Area

The South Area is more arid than the North Area and its vegetation is dwarfed and sparser; the diversity and productivity is less and recovery time is greater. Any disruption on the South Area will have a longer-lasting effect on flora.

A list of species likely to be found on TEAD-S is provided in Appendix B. This list has been compiled through literature research, interviews, and a brief survey of the installation. The map on the following page shows the general distribution of vegetation types on the South Depot, provides a general indication of the impacts of Depot activities, and identifies the fauna associated with the vegetation.

The dominant species of the South Area are of the Ephedra, Chenopodiaceae (goosefoots), Gramineae (grasses), or Asteraceae (sunflower) families. Most of the base is covered with big sagebrush, shadscale, Indian ricegrass, squirrel tail, or cheatgrass.

The predominant native vegetation on the South Area was a shadscale-sagebrush-grass mixture. Portions of the South Area remain that way, but other areas have been disrupted and seeded in wheatgrasses. The southwestern portion of the Depot is more alkaline, and greasewood-alkaline-sagebrush are the dominant vegetation. These plants might also be associated with the higher groundwater table and periodic inundation of the area during heavy runoff. The South Area has moderately impacted flora by altering the vegetation on disturbed areas.



The South Area has and is continuing to remove native perennials. In most cases the Depot is replacing them with perennial wheatgrasses. The removal of the woody perennials lowers the diversity of the perennial undercover of grasses and forbs. The impact is slight to moderate on perennial species.

Annuals (cheatgrass and Russian thistle) tend to take over areas that have been disturbed or have had the native vegetation removed. They are competitive with the wheatgrasses and other perennials for water and nutrients. The South Area has a slight to moderate impact in terms of an increase in less desirable annuals and exclusion of more desirable perennials.

There are no timber resources on the South Area, though a few junipers exist in the foothill area.<sup>146</sup>

The South Area contains no rare, endangered, or threatened species of plants and no significant plant diseases.

The South Area leases 1,601.08 acres for grazing and 36.44 acres for irrigating farming. The grazing lease is controlled by the Commander, who determines the length of the grazing period and the number of animals. The range is seeded in crested and spiked wheatgrass. The type, abundance, vigor, and nutrient cycle of vegetation are affected by grazing, as explained in the discussion of TEAD-N. However, the area grazed on the South Area is relatively small and the impacts are relatively slight.

The land leased as irrigated agricultural land produces 20 acres of alfalfa and 10 acres of oats. The land is irrigated from water from Ophir Creek. Alfalfa is a legume and has the beneficial effect of returning nitrogen to the soil. The area is also fertilized and native vegetation has been removed. The impact of this activity is also slight due to its size.

Contaminated areas of the South Depot are shown on the map on page 37. The impacts on flora of operation of the Imhoff tanks, sewage lagoon, septic tanks, and drainfields are generally beneficial. The septic tanks and drainfields add nutrients and water to the soil. The Imhoff tanks and sewage lagoon provide a critical habitat growing various species of hydrophytic plants. The sewage lagoon on TEAD-S is smaller than that on TEAD-N and its beneficial impacts are correspondingly small.

Other contaminated areas at TEAD-S have adverse impacts on vegetation ranging from slight to severe. The demolition and burning area has a slight to moderate impact on flora, due to possible contamination resulting from potential leakage or explosion; some materials may not have been demilitarized prior to burial. The sanitary landfills and unlined drainage pond have a moderate impact involving the possible uptake of contaminated substances. The covered gravel pit has a moderate to severe impact on South Area vegetation, due to possible contamination from explosion, leakage, and the mixing of chemicals; the materials in this pit have not been demilitarized. The unfenced and unposted pit at TEAD-S has an unknown but potentially severe impact on flora on the Depot; some of the contents of this pit are unknown.

The South Area has far fewer buildings, structures, and paved areas than the North Area and the impacts are correspondingly small. The direct physical impact of the unpaved roads, firebreaks, railways, and perimeter fence area is also small considering the area covered. The cumulative impact of herbicide use on these habitats would be slight to moderate.

Two housing areas are located on the South Area. One has been demolished and abandoned. The altered vegetation of this area is returning to the native flora due to lack of water. The impact is slight. The other is the leased housing area, where planted grass, trees, and shrubs are cultivated.

The igloo, open revetment, and ammunition areas on the South Depot have been moderately impacted by the mechanical removal of the native vegetation and replacing it with wheatgrass. Compaction of the soils has occurred during construction, replacement of the earthen igloo covering, and general use. The impact on vegetation in these areas is moderate.

Implementation of the Master Plan would mean construction of several new buildings on TEAD-S. These areas would be disturbed and native perennials would be eliminated. An invasion of Russian thistle and cheatgrass may occur in the disturbed areas around the buildings, but the area is relatively small and the impact negligible.

## 7.2 Depot Closure

In general, Depot closure would result in a successional plant reinvasion at TEAD-N and TEAD-S. However, succession is very slow in this climate and in areas of severe compaction is almost nonexistent. In other areas, halogeton, Russian thistle, gumweed, and ig bract verberna would invade, remain prominent for about two years, and gradually be replaced by perennial grasses, forbs, and sagebrush. Cheatgrass might alter this successional pattern in some areas; when it takes hold in a disturbed area, it becomes the climax vegetation, competing only with sagebrush and rubber rabbitbrush. Depot closure would have a beneficial impact on annuals and perennials, particularly woody perennials, as the original climax vegetation returned to most of the Depot.

If Depot closure resulted in the discontinuation of grazing and agricultural uses on Depot land, grasses and forbs would eventually recover on the land currently used for these purposes and might become the dominant climax vegetation in the distant future, except in areas overgrown by cheatgrass. The nutrient cycles would be restored. The danger of a fire starting would decrease due to the absence of human activity, though the danger of an existing fire spreading would be increased by the increase in vegetation.

Closure of the Depot would also result in the elimination of the landscaped and treated areas at TEAD-N and TEAD-S. Planted trees, shrubs, and bushes would eventually be replaced by native species due to the lack of water, thereby decreasing the nutrient cycle on-abes. The elimination of herbicide spraying on firebreaks, unpaved roads, railroads, and perimeter fence areas would also have a moderate impact. The soil and water would lose their contamination within two years and succession would begin.

For most of the contaminated activity areas at TEAD-N and TEAD-S, Depot closure would have slightly beneficial impacts on flora, though the potential for plant uptake and contamination of the food chain would remain for an indefinite period. At TEAD-N this is true of the holding/evaporation and evaporation pond; the open channel outfalls and holding pond; the storm sewer outfall; and the sanitary landfill. In the case of TEAD-S this description applies to the unlined drainage pond and the sanitary landfills. The landfills at both TEAD-N and TEAD-S would presumably be overcovered with soil and would eventually revegetate.

Depot closure would have virtually no impact on the potential floral contamination caused by the South Area's covered gravel pit, demolition and burning area, and unfenced and unposted pit. The potential for contamination through explosion, leakage, and the mixing of chemicals would remain.

Closure of the installation would have a slightly adverse impact on flora in eliminating flows to the sewage lagoons, Imhoff tanks, and drainfields. These areas currently generate water and nutrients and provide for the introduction of hydrophytes to Depot land.

## 8. Fauna

### 8.1 Continued Depot Operation

#### a. North Area

The living portion of an ecosystem is called a community. Community zones more or less follow the vegetative habitat areas as fauna interacts with flora. There is generally a great deal of overlapping especially by larger omnivores and carnivores who need a larger range.

The communities of TEAD-N are shown on the map on page 167. The North Depot is almost a closed community, which is a community in which no further species can find lodgement, either because of unfavorable environmental conditions or because all of the ecological niches are filled. Grazing cattle and sheep tend to increase the stress on the niches. A listing of the fauna likely to be found on the North Area is provided in Appendix B.

The North Depot's impact on wildlife is slight because of the small number of game animals on the base. Mule deer and cottontails compete with livestock for forage. Cover has been reduced for quail, grouse, pheasant, and chukar. The sewage lagoon has created a resting area for migratory waterfowl. Coyotes and bobcats fluctuate with the increases and decreases of the rodent and rabbit population. The Depot has no game management plan and no game animals have been stocked on TEAD-N. However, ringneck pheasant and chukar have been stocked in the area and are not on the Depot.

Contamination of wildlife species on TEAD-N is possible through a contaminated food chain. Wildlife diseases are endemic in the area of TEAD-N, but with the exception of an outbreak of Tularemia in Grantsville, they have had a very slight impact. The Depot and the Army Environmental Hygiene Agency are monitoring wildlife and have established procedures to handle an outbreak in the faunal population. The Depot does not allow hunting.

There are three types of critical habitat at TEAD-N: the sewage lagoon; the areas planted in grass, trees, and shrubs; and bald eagle habitat.

The impact of the sewage lagoon on fauna is moderate. It has displaced native species on a very small area. The lagoon has created a resting area for migratory waterfowl such as mallards, canvasbacks, and buffleheads, and it is one of the few locations of standing water in the area. Limited feeding occurs on the lagoon. These impacts are beneficial. The possibility of disease transmission through waterfowl is extremely low as demonstrated by the lack of disease caused by waterfowl using the numerous sewage lagoons in the country and subsequently being shot and consumed by sportsmen. Insects and mammals requiring open water may also be present on the lagoon, such as mosquitoes, mountain voles, and jack rabbits.

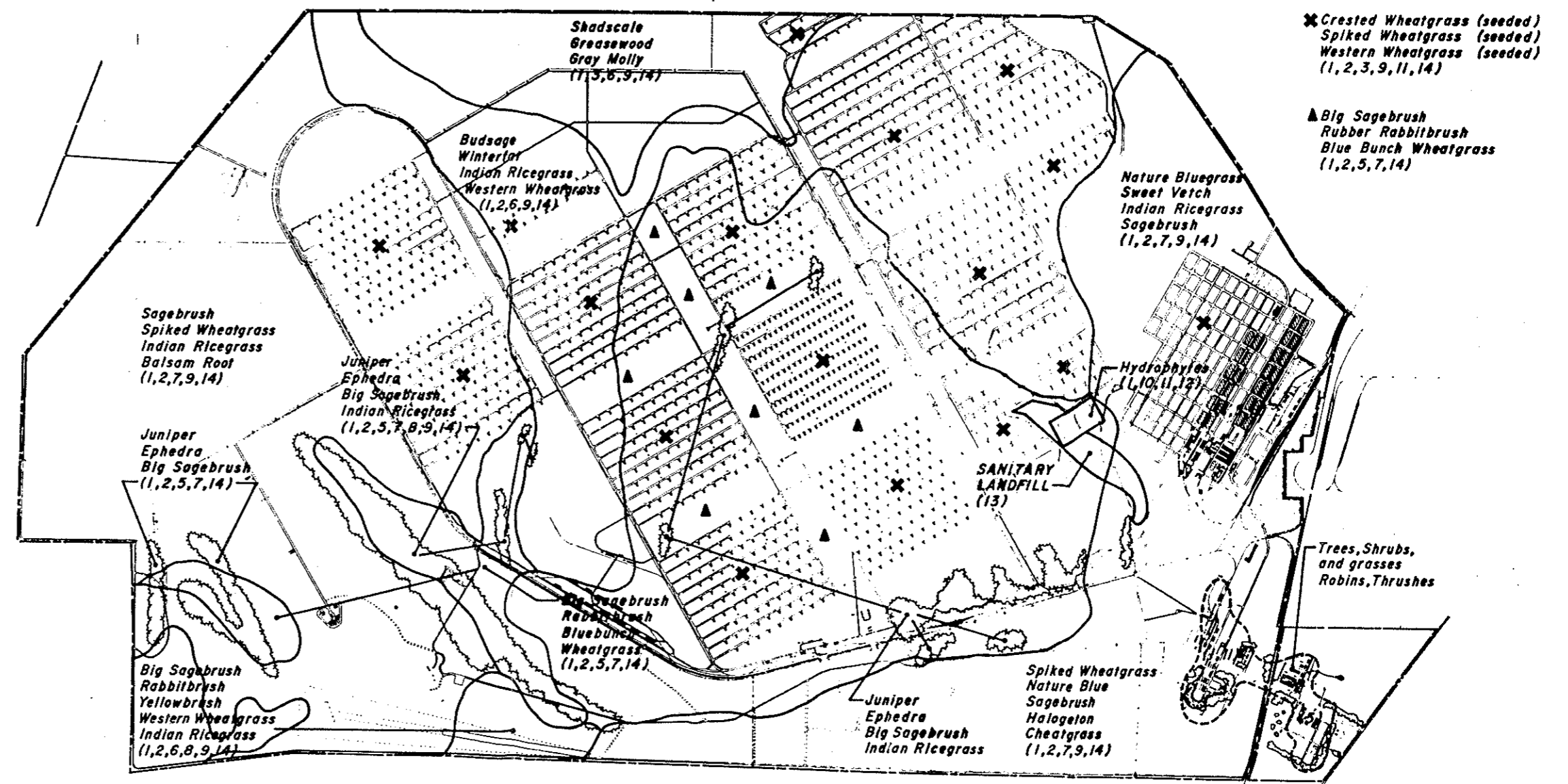
The area planted in grass, trees, and shrubs at TEAD-N is small, but the alteration from native vegetation is significant. This area acts as a bird magnet, supplying food, cover, perching, and nesting areas. Many of the warblers, thrushes, woodpeckers, and orioles would not be found at TEAD-N were it not for the non-native flora.

Bald eagles winter on the Depot and perch on power poles because of the Depot's topography and lack of trees. Eagles are being electrocuted when their wings touch more than one hot wire, especially when wet. Employees of the U.S Fish and Wildlife Service (FWS), Salt Lake City Regional Office, conducted a two-day survey during 1980 to determine the extent of the problem. No dead eagles were found on the Depot (two were found during a previous survey) and the survey indicated that there is no significant raptor electrocution problem.<sup>147</sup>

However, two other employees of FWS are of a different opinion and maintain that raptor electrocution is a significant problem.<sup>148</sup> Over 100 eagles were electrocuted in Utah during 1980. Based on this number and the number of eagles estimated to winter at the Depot annually, a low estimate of eagle electrocutions would be 10 to 20 annually. This is believed to be a low estimate because carrion-eaters would carry off eagle carcasses prior to discovery; snow could be covering some carcasses; it is nearly impossible to inspect all of the poles; and Indians are known to collect eagles for their plumage and claws. Based on recommendations by FWS, a limited program has been established including: (1) monitoring of power poles; (2) modification to poles when they are replaced; and (3) installation of protective perches on some power poles.<sup>149</sup>

The Depot also affects the eagle habitat with contaminated wastes and pesticides which are ingested by the eagles' prey through food and water sources and concentrated in the eagles. When eagles consume contaminated prey they are affected by a lowering of reproductive capabilities (i.e., thinner, more breakable eggs) and in some extreme cases, death. The impact would be moderate considering the wide range utilized by the eagle and the amount of pesticides, fertilizers, heavy metals, PCBs, and other pollutants off of the Depot. However, eagles are an endangered species and special efforts are necessary to ensure their survival as required by federal law.

The peregrine falcon has been sighted in the area but not on the Depot. To the degree that species use Depot land they may be affected by the contamination of prey just as the eagle is affected.



## LEGEND

### DOMINANT ANIMALS

- |                                 |                    |
|---------------------------------|--------------------|
| 1. Deer Mice                    | 10. Mountain Voles |
| 2. Antelope Ground Squirrels    | 11. House Mice     |
| 3. Least Chipmunks              | 12. Water Fowl     |
| 4. Little Pocket Mice           | 13. Norway Rats    |
| 5. Harvest Mice                 | 14. Eagles         |
| 6. Chisel Toothed Kangaroo Rats |                    |
| 7. Ord's Kangaroo Rats          |                    |
| 8. Desert Wood Rats             |                    |
| 9. Rabbits                      |                    |



**COMMUNITY ZONES**

Insects at TEAD-N are sprayed with various insecticides, mainly around inhabited buildings and structures. The areas planted in trees and shrubs are also sprayed to eliminate insects harmful to vegetation. Larger areas are sprayed to control mosquitoes, flies, mites, grasshoppers, and leaf chewers. Non-target species may pick up the insecticides, with debilitating results. Insecticides enter the food chain and are concentrated.

The impact of herbicides and rodenticides used at TEAD-N is even greater than that of insecticides. Herbicides are used on lawns (Dutch clover and dandelions), roads, perimeter fencing, fire breaks, railways, and parking facilities (broad-leaved weeds and all vegetation). Rodenticides are used to control rodents around buildings and structures and in the planted areas. The area impacted is relatively small, but over six times as much herbicide is used as insecticide. These pesticides may work their way into the food chain and eventually poison wildlife, livestock, and man. The Depot meets federal and state standards in application, dosage, and type of pesticide applied. The impact is slight to moderate. Pesticide usage for both the North Area and the South Area in 1981 is shown in Table 69.

Many of the contaminated areas on the North Area have an impact on the Depot's fauna. In some cases the effects are indirect, involving potential contamination of the food chain. This is true of the cement settling tank with four lined percolation and evaporation ponds, the laundry and shower waste area, the shallow pond, the gravel-lined pond, and the demolition and burning areas.

In other cases, the effects may also be direct. The holding and evaporation pond create a very slight change of faunal poisoning. The storm water outfall may lead to direct uptake of contaminants by animals. The drainfields increase the diversity of microfauna on the installation but may also contain some hazardous wastes. The sanitary landfill provides a feeding ground for rats, carrion eaters, and other rodents and may lead to faunal-vector disease. Finally, the open channel outfalls and holding pond may lead to the contamination of livestock and poisoning of other fauna through drinking, which in turn may lead to faunal-vector disease. An oil interceptor has been installed for use with the outfalls and holding pond but it is not completely effective. The holding pond will be fenced during 1982, which will mitigate the present potential impact.

Grazing in the North Area has a moderate impact on fauna. Grazing physically tramples vegetation and caliche, allowing wind erosion; reduces cover; reduces food supplies; increases inter- and intra-species competition; compacts soils, making burrowing difficult; and reduces soil moisture holding capacity. These factors reduce the type and diversity of animal species as well as the number of individuals. Although grazing affects nearly the entire North Area, it is controlled and impacts are not as severe as they might be.

The elimination of native vegetative areas for buildings and structures on the North Area has decreased the native population by a small amount. On the other hand, species such as house mice, house flies, porcupine, and big brown bats flourish in this environment. Buildings and structures also provide nesting and routing areas for some birds, like barn owls. In general, the impact is relatively slight due to the small portion of the base that has been altered.

TABLE 69  
PESTICIDE USAGE - 1981  
(North and South Areas)

<u>Pesticide</u>	<u>Amount</u>	<u>Dilution</u>	<u>Affected Species</u>
Ronzol Gophercide Anticoagulant Warfarin	410 lbs.	0.005%	Gophers
Rodenticide	18 lbs.	0.0025%	Gophers, mice, and rats
Ficam-W	136 ga.	.25%	Roaches, spiders, ants, wasp
Ficam-W	8 ga.	.50%	Spiders, scorpions
Dursban	936 ga.	1.5%	Grasshoppers, leaf chewers, mites
Malathion	17,509 ga.	1.0%	Mosquitoes, leaf chewers, flies
D-TOX-E	8 ga.	1.1%	Roaches
Cloradane	480 ga.	2.0%	Terminates
Diazinon	6 ga.	.5%	Roaches
Pyrethrum	2 ga.	.5%	Roaches
Carbaryl	150 ga.	.48%	Box elder bugs
Estron 99 2-4-D	3,212 ga.	.48%	Broad leaf weeds
Krovar	16,400 ga.	.48%	All vegetation
Hyvar-Y	3,000 ga.	.48%	All vegetation

\*\*\*\*\*

Native vegetation of the igloo and open revetment areas has been removed mechanically, and wheatgrasses were seeded. The impact on fauna in this area is moderate. Harvest mice, deer mice, grasshopper mice, little pocket mice, and kangaroo mice will live in the grassy areas, although most prefer burrowing under sagebrush, shadscale, greasewood or other woody shrubs. Kangaroo rats, chisel-toothed kangaroo rats, antelope ground squirrels, and rabbits will forage in the area for food but require shrubs for cover and food. Some pockets of brush still exist in the area.

The roads on TEAD-N have an indirect and apparently minor impact on fauna in terms of animal road kills, which usually occur at night. Associated with these kills are raptor kills, sometimes involving eagles, which feed on road kills and in turn are sometimes hit. Speed limits on the Depot makes road kills less likely to occur than on surrounding highways.

The impact of reserve training on fauna is slight to moderate. Reserve activity is relegated to a moderate-sized area. The disruption of vegetative food sources and cover tends to force the animals out of the area. The noise and physical presence of a large number of humans and vehicles may also scare the animals out of the area. This would affect fauna such as rabbits, antelope ground squirrels, chisel-toothed kangaroo rats, horned larks, and red-tailed hawks.

Implementation of the Master Plan will have little impact on the fauna of TEAD-N. Construction of new buildings will permanently displace some animals and temporarily disturb others. Additional power lines to supply the new buildings will be of the modified type (one wire on the top of the pole and

the other two at the ends of lowered cross bars), so eagle electrocutions will not increase. The decrease of sanitary wastes in the landfill due to construction of the proposed incinerator will decrease the rodent population feeding on the landfill.

#### b. South Area

The communities at TEAD-S are shown on the map on page 173. A listing of the fauna likely to be found on the South Area is provided in Appendix B.

There are only a few game animals on the South Area, so the Depot's impact on wildlife is slight. Mule deer and cottontails may occasionally forage on the Depot. Cover has been reduced for quail, grouse, pheasant, and chukar. A beneficial impact on wildlife is the resting area for waterfowl on the sewage lagoon. Coyotes and bobcat may hunt on the South Area; the incidence of their occurrence depends on the relative abundance of prey. The South Area has no game management plan and no game animals have been stocked on the Area. However, ring-necked pheasant and chukar have been stocked in the vicinity and probably are on the South Area at some time.

Contamination of wildlife species on TEAD-S is possible through a contaminated food chain. Wildlife diseases are found in the area but appear to have no impact on the Depot; nor does TEAD-S impact the diseases. Stockton had an outbreak of Anthrax in 1975 and its natural reservoir is believed to have started in 1860. Tooele Army Depot and the U.S. Army Environmental Hygiene Agency are monitoring wildlife and have established procedures to handle an outbreak in the faunal population of TEAD-S. The Depot does not allow hunting.

The South Area has three types of critical animal habitat similar to those found at TEAD-N: a sewage lagoon; areas planted in grass, trees, and shrubs; and habitat for bald eagle and peregrine falcon.

The sewage lagoon in the South Area has a moderate impact on fauna. A small displacement of native species has occurred, but a relatively large number of species now using the lagoon would not normally be present. Waterfowl (ruddy duck, canvasback, and common merganser) use the lagoon as a resting area. Other species requiring open water may use the lagoon, such as mosquitoes, mountain voles, and jack rabbits. There is a slight change that some animals might be infectious from the sewage in the lagoon and possible transmit a disease back to the human population.

Only a small portion of the South Depot is planted in grasses, trees, and shrubs, so the impacts in terms of non-active animal species using these areas is slight.

Bald eagles and possible peregrine falcons use the South Area as a hunting, roosting, and (in the case of the prairie falcon) mating range. Eagles are especially prevalent in the Ophir drainage basin and the southern part of the area. TEAD-S is relatively undisturbed by man's activities and provides food and roosts (utility poles) required by these and other raptors. However, there are also some adverse impacts. Eagles are being electrocuted on unmodified power poles. The South Area has placed perches on six to 10 problem poles but the eagle seem to avoid them. A new modification (lowering

the cross bars and running a wire on each end and one on the top of the pole) is proceeding as the poles need replacement. The South Area is also monitoring eagle electrocutions. Another possible impact is the effect of prey being contaminated by hazardous chemicals from the South Area.

Insecticides are very rarely used at TEAD-S. Insects are probably not of great importance as pests on the South Area due to the transient nature of the human contact and lack of cultivated ground. Some insecticides are probably used on the alfalfa and oat crops.

Hyvarx bromacil is a herbicide used at TEAD-S as a soil sterilant on railroad beds, parking lots, fire breaks, and chain link fencing mainly as a security measure. It is effective for two years. Soil sterilants encourage wind erosion on defoliated areas. There is also the possibility of the herbicide becoming included in the food chain. The impact of herbicides is slight due to their limited usage. See Table 69 for a summary of pesticide usage for both the North Area and the South Area in 1981.

Contaminated areas on TEAD-S impact fauna in several ways. The unlined drainage pond probably only affects fauna through potential contamination of the food chain. The sanitary landfills provide a feeding ground for rats, carrion eaters, and other rodents and may lead the faunal-vectored disease. The septic tanks and drainfields increase the diversity of micro-fauna at TEAD-S but may also contain some poisonous wastes. The covered gravel pit, the demolition and burning area, and the unfenced and unposted pits have the potential for significant effects on the animal population of TEAD-S because of potential exposure, leakage, and mixing of chemicals.

CAMDS has a slight impact on fauna. The area is covered is relatively small, but it handles demilitarized toxic chemicals, which becomes a salt. The salt is gathered in drums and stored. Monitoring has indicated that there is a very slight change of contaminating fauna by the operation of CAMDS. Test holes are being bored to determine if there is any leakage from storage of hazardous wastes. A study was recommended in 1973 by Dugway Proving Ground Life Sciences Division to test vegetation and small mammals for mustard or organophosphate contamination.<sup>150</sup>



The impact of grazing on South Area fauna is slight due to the relatively small area grazed. The impact of agriculture is more significant as a result of irrigation. The water used attracts rabbits, mice, and ground squirrels and their predators. The oats and alfalfa are a plentiful good source. The irrigated area is, however, very small (36.44 acres).

The impact on fauna by buildings and structures in the South Area is slight due to the small proportions of the area that has been altered.

The native vegetation of the igloos, open revetment, and ammunition areas at TEAD-S has been mechanically removed and wheatgrasses were seeded. The impact of these actions on fauna is moderate. Harvest mice, deer mice, and kangaroo mice will live in the grassy areas although most prefer burrowing under sagebrush, greasewood, and other woody shrubs. Kangaroo rats, antelope ground squirrels, and jack rabbits will forage in the grass areas but require shrubs for food and cover. Some pockets of brush still exist in the area.

There are occasional road kills at TEAD-S, but this is not a significant problem.

Little new construction is scheduled for TEAD-S under the Depot's Master Plan. The primary impact of Master Plan implementation on the fauna of the South Area will result from the reduced usage of the sanitary landfill due to the trucking of sanitary waste to the new North Area incinerator. This will reduce the rodent population currently using the South Area landfill.

## 8.2 Depot Closure

In general, Depot closure would have a relatively slight impact on fauna at TEAD-N and TEAD-S, assuming that the Depot were simply abandoned and a pattern of natural succession allowed to re-establish itself on Depot land. Succession would be slow to re-establish in this area because of the climate, and some portions of the installation might never re-establish its native fauna.

The three critical habitats at TEAD-N and TEAD-S would be affected fairly significantly. The sewage lagoons and Imhoff tanks would be drained and eliminated, ceasing to produce nutrients for the food cycle and provide habitat for the development of microfauna; they would also no longer pose a danger of faunal-vectored disease. The planted areas would eventually return to native vegetation due to lack of care and water, ceasing to provide habitat for non-native birds. Bald eagle habitat would be benefitted by Depot closure, since closure would eliminate power needs and the lines would be deactivated. In addition, the cumulative impact of eliminating contaminated wastes and resultant vegetative and prey contamination would aid in the eagle's survival.

Depot closure would have little impact upon fauna near buildings and structures since they would remain. The roads, fire breaks, perimeter fencing, and railways would eventually revert to the natural state, as chemical treatment of these areas would cease. The use of chemicals as insecticides and pesticides would also cease, possibly increasing the number of some species currently controlled.

Closure of the Depot would beneficially impact the fauna of the grazed area as a result of an increase in vegetation and removal of livestock as a food competitor. Cessation of agriculture at TEAD-S would have a slight impact on fauna, removing a food and water source.

In the case of many of the contaminated areas at TEAD-N and TEAD-S, the impacts of Depot closure would be at least slightly beneficial. The effluent would be eliminated in the holding/evaporation pond at TEAD-N, eliminating the chance of animal poisoning. No new waste would be generated through the open channel outfalls and holding pond for possible uptake by animals. The cessation of wastes generated into the storm sewer outfall and into drainfields would eliminate the possibility of spreading faunal-vectorized disease. Covering over the landfills would eliminate the community of rats, carrion eaters, and other rodents which inhabit such areas. The demolition and burning ground areas at TEAD-N would cease to be used for their present purpose and might be repopulated.

However, in many of the contaminated areas, the possibility of faunal contamination through food chain poisoning would remain long after the installation ceased being used for its present purpose. This would be true of the North Area's cement settling tank with four lined percolation and evaporation ponds, laundry and shower waste area, shallow pond, gravel-lined pond, open channel outfalls and holding pond, storm sewer outfall, sanitary landfill, and demolition and burning ground areas. It would also be true of the South Area's sanitary landfill and unlined drainage pond.

In the case of the South Area's covered gravel pit, demolition and burning area, and unfenced and unposted pit, the potential impacts on fauna would remain the same due to possible explosion, leakage, and mixing of chemicals.

## 9. Noise

### 9.1 Continued Depot Operation

#### a. North Area

The noise levels generated on North Depot land are generally related to activities. For the most part, activities which regularly generate noise are limited to specific areas which make up a relatively small portion of the total area of the Depot.

The storage area (igloo and open revetment) and buffer areas which comprise the major portion of the Depot have relatively low levels of noise-generating activity. The noise levels generated in these areas are normally related to vehicular traffic (truck and train in the ingloo storage area). These storage areas are located a considerable distance from off-Depot populated areas.

The ammunition maintenance areas do not generate significant levels of exterior noise and are located over two miles from other Depot activity areas. The distance to any areas of human habitation off the Depot is over three miles. The exterior noise levels generated in this area are associated with vehicular movement (truck, train, and automobile).

The administrative, medical, industrial, troop housing and support, and recreational areas located in the southeast corner of the Depot do not generate significant noise levels. The nearest off-Depot residential area is located over 3,200 feet from these areas. Again, vehicular traffic movement is the major source of exterior noise levels. Traffic noise levels are concentrated in the morning (inbound work traffic) and afternoon (outbound work traffic) along the route to the main gate.

The warehouse and supply area and Defense Property Disposal Office (DPDO) yard are the major activity areas on the North Depot. They are also located in the northeastern portion of the Depot, which is nearest to the residential areas of Tooele City. Open storage areas surround these activity areas on essentially all sides. The yard area is over 4,000 feet and the maintenance area over 5,000 feet from the nearest off-Depot residential area. In addition, both the Tooele County and Tooele City zoning maps show the areas adjacent to the Depot as industrial areas. The Tooele Municipal Airport and off-Depot rail facilities currently occupy the majority of the area along the Depot boundary.

The exterior activities to the warehouse, supply, and DPDO areas which generate noise are associated with rail, heavy truck, loading equipment, and automobile operations. As mentioned previously, a diesel-electric locomotive will generate noise levels up to 88 dBA, heavy trucks up to 82 dBA, and automobiles up to 71 dBA 50 feet from the source. Loading equipment will generate noise levels between 95 and 100 dBA at the source.<sup>105</sup> These noise levels are reduced significantly for off-Depot residential areas as a result of distance attenuation and building and terrain blockage. It is estimated that locomotive operations are reduced to less than 55dBA at the nearest off-site residential receptor.

There are several other use areas on the North Depot which generate noise on an intermittent basis. These include the ammunition demolition area, the rifle range, and the heli-pad.

The ammunition demolition area which is located in the southwest corner of the Depot. The area immediately surrounding the demolition center point develops noise levels of about 75 dBA. The 50 dBA contour has a radius of approximately 4.5 miles from the demolition center point. The major activity areas on the Depot are outside of this range.

The demolition area is screened from the line of sight by terrain from the inhabited areas of Grantsville, Tooele City, and Stockton. The distance from the demolition area to these communities is five to six miles. However, on days when the atmospheric conditions are unfavorable (during temperature inversion), sound waves from demolitions can be heard in these areas. For this reason demolition is strictly limited to times when atmospheric conditions are favorable. It should be noted that no noise problems originating from these demolition activities have been reported by the Tooele County Planner. Occasional complaints of vibration have been reported, but no damage has been confirmed.<sup>151</sup>

The firing range is located along the western portion of the Depot. The firing area of the range is located approximately three miles from Grantsville and seven miles from Tooele City and Stockton. The range is used by army reserve forces and by TEAD security forces for small arms fire (up to M-60 machine gun) approximately two months a year. Small arms such as M-14 and M-16 rifles and the M-60 machine gun generate peak noise levels at the source between 155 and 159 dBA.<sup>152</sup>

The heli-pad is located along the east side of TEAD administrative and medical areas. Use of the heli-pad is infrequent and no significant impacts on TEAD personnel are presented by its use. The noise levels generated by helicopter operations range from 86 to 110 dBA in the cockpit.<sup>153</sup>

Interior noise levels generated by certain maintenance and rebuild operations within the maintenance and supply areas exceed hazardous levels, which are defined by the Army as 85 dBA for steady noise regardless of duration and 140 decibels for impulsive noise.<sup>154</sup> A noise and hearing conservation survey conducted on the Depot in January of 1981 identified operations generating hazardous noise levels and discrepancies with respect to use of appropriate safeguards.<sup>155</sup> A base-line noise survey of the Depot has recently been completed under contract with DARCOM, but the results of this survey are not available at this time. Survey information will be used to ensure compliance with applicable guidelines and regulations.

#### b. South Area

There are no significant noise-generating activities on TEAD-S. Truck, automobile, and occasional rail traffic is the primary source of exterior noise. The heli-pad in the CAMDS area is the source of infrequent noise from rotary-wing aircraft. Interior noise sources from equipment operation within the CAMDS area are rated at less than 85 dBA.<sup>156</sup>

The firing range in the South Area is used throughout the year both day and night. The sound levels emitted would be the same as discussed above for the North Area range. However, because of the lack of residences in the area off Depot land, no significant noise impacts are generated by the use of this facility.

### 9.2 Depot Closure

Closure of the Depot would eliminate the activities that presently generate noise. The potential noise hazard to personnel presently exposed to high noise levels in their activities on the Depot would also be eliminated. Although the operations on the Depot have not been identified as a significant noise source with respect to off-Depot activities, there are times when noise generated on the Depot is heard off the Depot. This noise impact would also be eliminated by Depot closure. In addition, the noise made through the downtown area by the vehicular traffic generated by the Depot would no longer occur.



### c. The Human Environment

#### 1. Population

##### 1.1 Continued Depot Operation

Continued operation of TEAD at the present level will support future population growth in the area. However, growth at TEAD and Tooele County growth have been tied closely in the last decade. During the period 1971 to 1981 TEAD employment declined by 15.3%, while population in the county grew by estimated 20.8%. Diversification of the economy over the years has lessened the dependence on governmental employment. In fact, with the exception of the depressed construction industry, government employment was the slowest-growing category of activity over the last few years. With increasing numbers of manufacturing and other types of jobs, TEAD activities should have a less significant impact on population growth in the years ahead than in the past.

The geographic location of the Tooele Depot will also work to limit its impact on area population. Thirty-five percent of those employed at TED make their residence in other counties, primarily Salt Lake County. The proximity to this large urban area facilitates commuting and therefore limits the impact of TEAD activities on Tooele County growth.

The number of people residing on Depot land is small, as only five permanent living units exist. These units are occupied by officers. In addition, there are 51 units on Depot land that were part of the Depot at one time but are now privately owned. Twenty-five of these units are in the North Area and 26 in the South Area. The people living in these 51 units are not connected with TEAD and therefore do not represent a population impact of TEAD.

The Tooele Depot draws its employees from the regional labor market and is not bringing significant numbers of military personnel into the area. However, Depot operation does contribute significantly to support of the area's population. It is estimated, for example, that 2,689 of the employees at the Depot reside in Tooele County. In addition, it is estimated that 963 secondary and support positions in Tooele County are tied to operations of the base. At the rate of three persons per household, this means that 10,956 Tooele County residents are supported wholly or in part, directly or indirectly, by Depot operation. This represents 42% of the 1980 population of Tooele County.

Affirmative action programs at the Depot, which increase minority employment, impact the composition of the local population to some extent as shown in Tables 70 and 71. TEAD employs a much higher percentage of black workers than the county or the state. In fact, it employs nearly all the black workers in the county, bringing the black population of Tooele County up to the state average. The impact of the large number of Hispanic workers at TEAD is more obvious. The Depot has approximately three times the state average for Hispanic employment, which is reflected in a county population that is double the state average for Hispanics. Conversely, TEAD employment of Asian peoples is below the state average and is also reflected in a lower than average Asian population in Tooele County.

TABLE 70  
PERCENT OF EMPLOYED WORK FORCE  
BY ETHNIC GROUP

	<u>Utah</u>	<u>Tooele County</u>	<u>TEAD</u>
Black	0.4	0.3	1.2
Hispanic	3.4	7.6	9.0
Indian	0.6	1.0	0.5
Asian	1.0	0.9	0.6

Source: U.S. Department of Commerce, Bureau of Census, Census of Population and Housing, 1980; and Equal Employment Opportunity Office, Tooele Army Depot.

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TABLE 71  
PERCENT OF POPULATION BY ETHNIC GROUP

	<u>Utah</u>	<u>Tooele County</u>
Black	0.6	0.6
Hispanic	4.1	9.2
Indian	1.3	1.4
Asian	1.0	0.6

Source: U.S. Department of Commerce, Bureau of Census, Census of Population and Housing, 1980; and Equal Employment Opportunity Office, Tooele Army Depot.

\*\*\*\*\*

The baseline population projection that has been done for Tooele County by the State Planning Coordinator's Office<sup>157</sup> assumes continued operation at TEAD but no significant expansion. Under this assumption, growth in Tooele County will amount to 30.2% over the next five years, which is about the same percentage increase as during the last decade. The baseline projection also assumed that private industrialization will continue to grow more rapidly than the Tooele Depot and other defense sector employers. The continuation of operations at TEAD is necessary to maintain the projected growth in population. However, other factors are expected to be more important in the future growth of the country, including the development of manufacturing and secondary activities related to energy development in other areas. To a large extent Tooele County will be pulled along to a higher growth figure by urbanization and industrialization in the Wasatch Front Region as a whole.

## 1.2 Depot Closure

The driving force behind population growth is employment opportunities. The elimination of over half of the jobs in Tooele County through Depot closure would certainly have an effect. The loss of employment by the 2,689 TEAD workers residing in Tooele County would also cause a decline of an estimated 963 secondary and support positions in the county. Assuming an average household size of three and a total out-migration of these 3,652 workers, population in the county would drop by 10,956 or 42%. However, if growth continues in the Salt Lake area and in local mining and manufacturing, this loss would be mitigated significantly.

Over the past 10 years Tooele County has grown more slowly than surrounding communities because of its stable employment base. Population growth has recently been spreading to less urbanized areas within commuting distance of cities. This suburbanization has started in Tooele County and will continue as most new residents are oriented to Salt Lake City rather than TEAD. However, the closure of TEAD and the resultant decline or disappearance of local retail and service firms might render this area less desirable to new residents.

If economic slack were not taken up by private employers, out-migration would change the composition of the population. Areas with little or no economic growth experience an increase in the proportion of older persons as the younger and more mobile workers leave the area. In addition, the previous analysis showed a link between TEAD jobs and an above-average minority population, especially in terms of blacks and Hispanics. With closure of TEAD and without other job growth, these ratios would trend to a level more reflective of the region as a whole.

At the regional level the population impacts would be small due to the large population base in the Salt Lake/Ogden area. Many workers currently living in Tooele would probably move to the larger centers to work.

## 2. Housing

### 2.1 Continued Depot Operation

The five on-base housing units at TEAD do not affect the local housing market. However, demand for privately-owned housing units by TEAD employees has a substantial impact on housing stock. In 1980 the Tooele County housing stock numbered 8,800 units. Directly employed TEAD workers and secondary sector workers living in the county are estimated at 3,652. While there is some duplication, for purposes of estimation these wage earners are assumed to represent demand for housing units. In other words, roughly 3,652 of the 8,566 units (43%) are attributable to TEAD workers or the secondary employment derived from TEAD payroll.

In spite of this, the growth in employment at TEAD over the past 10 years has been negative, while county housing units increased by 2,111. During this period the percentage increase in population was outpaced by growth in housing units as the size of households declined. It is obvious that growth of jobs at TEAD was not responsible for the growth in housing over the last decade. Therefore, while TEAD's impact on the housing stock is substantial, diversification of the economy and resultant population increases are impacting growth in the housing stock to a greater extent than TEAD.

If employment remains constant at TEAD the impact on housing vacancies should be stabilizing. Because these workers are the dominant force in the market, their continued employment will provide a basic level of demand. However, they will not add significantly to future housing unit demand.

## 2.2 Depot Closure

Closure of the Depot and out-migration of the resident employees would create a serious oversupply of housing units in Tooele County. Vacant units were estimated in 1980 to number 343 out of an estimated county housing stock of 8,566. The total primary and secondary impact of TEAD closure would affect 3,652 wage earners. It is likely that some of these people would stay in the Tooele area and commute to new jobs in the Salt Lake area. Also, if the diversification of the local economy continues, some would find new employment locally. If a worst-case scenario of 100% out-migration is assumed, the vacancy rate would rise from approximately 4.0% (rental and owner-occupied units combined), to a rate of 46.6%. If only one-half of this out-migration materialized, the rate would still increase to 25.3%.

The impact of this surplus of housing would cause a stagnation or decline in the value of virtually all housing in the county. The magnitude of the decline is difficult to estimate from available data, but it could be substantial.

Construction of new dwelling units would be severely retarded in the face of such a large surplus. The baseline projection for housing-unit growth anticipates 1,700 new units per year between 1980 and 1985. In the baseline projection, the activities of TEAD were not considered a major factor. The 1980-85 growth is tied primarily to regional economic growth and new resource-based industries in Tooele County. Therefore, the closure of TEAD would not lower this future demand. However, it would cause an increase in supply, making construction of new units unnecessary to meet that demand. Under worst-case conditions, the 3,652 living units vacated in Tooele County would take over two years to absorb with no new construction taking place.

## 3. Economic Conditions

### 3.1 Regional Economy

#### a. Continued Depot Operation

Payroll from TEAD operation amounted to \$84,461,860 in FY 1981. This money is recycled into the economy after deductions for taxes, social security, and saving of all types. Recycling is directly reflected in retail sales in the county where the employees reside. The impact is calculated by applying a 92% personal consumption constant to disposal personal income totals distributed by employee residence location. Secondary or induced sales are derived as these payroll dollars are passed through the economy. These secondary impacts are calculated by applying the constant to the induced income figures developed in subsection 3.3 below omitting unemployment benefits (see Tables 72 and 73).

Areas in Utah garnered over \$106 million in retail sales due to the operations of Tooele Army Depot in 1980. This equals 1.2% of total retail sales in the state. The effect on the Tooele County area is much greater, accounting for 26.5% of the retail activity countywide. Salt Lake County receives almost the same dollar amount in retail impact as Tooele County, but due to the large size of the Salt Lake economy these sales amount to less than 1% of the total.

TABLE 72  
DIRECT AND INDUCED RETAIL SALES IMPACT  
OF TEAD OPERATION  
1980  
(\$000)

	<u>Disposable Payrolls</u>	<u>Direct Retail Sales Impact</u>	<u>Induced Retail Sales Impact</u>
Utah State	67,890	62,459	43,721
Wasatch Front	65,542	60,299	31,480
Salt Lake County	20,946	19,270	22,980
Tooele County	43,920	40,406	8,372
Weber County	676	622	128
Rest of State	2,027	1,865	12,242

Source: Haworth and Anderson, Inc.

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TABLE 73  
PERCENTAGE OF SALES ATTRIBUTABLE TO TEAD  
1980  
(\$000)

	<u>Actual Sales</u>	<u>Total TEAD Impact</u>	<u>TEAD as %</u>
Utah State	8,691,072	106,180	1.2
Wasatch Front	5,140,046	91,779	1.8
Salt Lake County	4,301,997	42,250	0.1
Tooele County	183,996	48,778	26.5
Weber County	754,053	750	0.01
Rest of State	3,551,026	14,107	0.4

Source: Utah State Tax Commission, "Gross Retail Sales and Purchases in the State of Utah, 1978 through 1980," June, 1981; and Haworth and Anderson, Inc.

\*\*\*\*\*

The Tooele Army currently leases 21,683 acres of its 44,096 acres for agricultural use, predominantly grazing. This constitutes 4.4% of the 495,494 agricultural acres in the county.

#### b. Depot Closure

Table 73 shows the loss of sales to the region that would result from Depot closure. According to this data, closing TEAD would hit hard at the retail/service sector in Tooele County with sales declining over 25%, from \$183,996 to \$135,218. Salt Lake County, with its much larger base, would be able to absorb a similar magnitude of lost sales with overall activity declining only 1.0%.

The impact of TEAD closure on retail activity would be mitigated by the proximity of the Depot to the Salt Lake City area and the large number of commuting workers. The existing trade and service sector in Tooele is relatively small, so even workers who live there make a significant number of purchases outside the immediate area. In other words, Tooele is not currently capturing a large share of retail sales generated by TEAD; therefore, the impact of closure on Tooele County would be less than might be expected of the county's largest employer. However, the impact of closure would still be drastic.

The \$106.2 million in lost sales would be distributed predominantly to Tooele County with 45.9% of the total and Salt Lake County with 39.3% of the total. The rest of the state (including Weber County) would lose 0.3% of its retail sales total due to TEAD closure, amounting to 14.8% of total retail impact. This rest-of-state figure is high due to the inclusion of TEAD purchases of supplies in the multiplier factor used for the state.

At the present time TEAD leases 21,683 acres for grazing. With the closure of the Depot this acreage might become unavailable for such purposes; or it might still be available if the Depot reverted to private ownership. This acreage is approximately half of the total Depot acreage. Taking into account the land occupied by buildings and the contaminated land, it is doubtful that much more could be made available under private ownership.

### 3.2 Employment

#### a Continued Depot Operation

The Tooele Army Depot is the major employer in Tooele County, employing 4,137 people and accounting for 41.7% of the county's non-agricultural employment. Employment at the Depot for selected years is shown in Table 74.

Entry-level positions at the Depot start at \$4.30 per hour for a clerk, between \$6.59 and \$7.23 per hour for material handlers, and \$7.56 per hour for truck drivers. Excluding the mining industry, TEAD has a higher wage structure than the average for the state. In line with this there is little reported problem with labor turnover at the Tooele Army Depot.

TABLE 74  
TEAD EMPLOYMENT FOR SELECTED YEARS

	<u>Civilian</u>	<u>Military</u>	<u>Total</u>
1965	3,819	28	3,847
1967	5,731	17	5,748
1971	4,852	30	4,882
1974	4,468	44	4,512
1976	3,762	78	3,840
1980	4,297	NA	NA
1981 (FY)	4,065	72	4,137

Source: Bureau of Economic Research, University of Utah; "Impact of Tooele Army Depot on Tooele County and the State of Utah," January, 1975; and TEAD Finance and Accounting Division.

\*\*\*\*\*

TEAD job contribute to the economies of nearly all Wasatch Front counties, as many workers commute from neighboring areas. As shown in Table 75, 65% of TEAD's employees live in Tooele County, while 31% live in Salt Lake City. The Remaining 4% live in the Provo and Ogden areas.

In addition to direct employment impact, the secondary or induced employment caused by TEAD jobs and payroll is substantial. Induced impacts have been calculated by use of multiplier factors. These factors have been calculated in the past for TEAD goods and services expenditures using the Utah State Input-Output Study.<sup>158</sup> The relevant multipliers estimate the ratio of job and income growth in the state economy induced by employment and associated purchases of supplies at the Tooele Army Depot.

The nature of this analysis is such that the resulting impacts are not broken down by county. However, due to the fact that the majority of Utah economic activity takes place in the Wasatch Front Region, the statewide induced impact can be allocated to this region on a pro rata basis. State multipliers developed in the previous study were 2.2 for employment and 1.72 for income. Applying these state multipliers to individual counties would be inaccurate as the magnitude of the multiplier depends on the size and diversity of the economy being analyzed. In addition, these will change as the mix of goods and services purchased by TEAD changes. Since 80% of direct goods and services purchased is strictly wages to employees, these ratios are sufficient for estimation purposes.

It is thus estimated that operation of the Tooele Army Depot generates 4,964 secondary jobs. The induced employment impacts are most evident in Salt Lake County (see Table 76), which has 2,611 of these jobs. Tooele County provides secondary employment to 963 people, while the induced employment effect in other parts of the state equals 1,390.

#### b. Depot Closure

Table 75  
TEAD PERSONNEL BY LOCATION OF RESIDENCE  
1981

	<u>Personnel</u>	<u>Percent</u>
Total	4,137	100.0
Tooele County	2,689	65.0
Tooele	2,193	53.0
Grantsville	372	9.0
Stockton	83	2.0
St. John	29	0.7
Vernon	8.3	0.2
Dugway	4.1	0.1
Salt Lake County		
Salt Lake City	1,283	31.0
Utah County		
Provo	124	3.0
Weber County		
Ogden	41	1.0

Source: Bureau of Economic Research, University of Utah; "Impact of Tooele Army Depot on Tooele County and the State of Utah;" January, 1975; and TEAD Finance and Accounting Division.

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TABLE 76  
EMPLOYMENT IMPACT OF TEAD  
1980

	<u>Total Employment</u>	<u>Direct TEAD Employment</u>	<u>Induced TEAD Employment</u>	<u>Total TEAD Employment Impact</u>	<u>% of Total</u>
Utah State	585,331	4,137	4,964	9,101	1.6
Wasatch Front	384,215	4,013	3,574	7,587	2.0
Salt Lake County	270,429	1,282	2,611	3,843	1.4
Tooele County	8,156	2,689	963	3,652	0.1
Weber County	59,156	41	0	41	0.1
Rest of State	201,116	124	1,390	1,574	1.0

Notes:

<sup>1</sup>Based on a 72% share of statewide income generation (by place of work) within the Wasatch Front.

<sup>2</sup>Based on a 73% share of Wasatch Front income generation.

Source: Utah Department of Employment Security, "Volume III Labor Force Information," and Haworth and Anderson, Inc.

\*\*\*\*\*

The elimination of the 4,137 civilian jobs at the Tooele Army Depot and the possible transfer of many of the 85 military personnel would impact the entire Wasatch Front region due to the large number of commuting workers. Table 77 computes unemployment rates for the counties involved in TEAD were shut down completely, assuming the loss of all 4,137 primary jobs and 4,952 secondary jobs.

The majority of secondary employment impacts would take place in Salt Lake County due to its position as a trade and service center for the region. The remainder of Wasatch Front secondary impacts are allocated to Tooele County as this is the residence of the majority of workers. The rest of the state would lose employment indirectly through the lack of purchases of goods and services by TEAD. This impact is estimated as the residual statewide impact after the Wasatch Front region is extracted.

Of course, the largest impact would be in Tooele County. Even though only 65% of TEAD workers live in Tooele County, closing the Depot would result in a projected unemployment rate of 48%. Salt Lake County is the residence of 31% of TEAD workers; upon plant closure this county's unemployment rate would increase from 5.1% to 6.5%. The closure of the Depot would raise the Utah State rate from 5.4% to 6.9%. These estimates are based on 1980 employment and labor force figures and assume no re-employment of primary or secondary workers in the region.

TABLE 77  
EMPLOYMENT IMPACT OF DEPOT CLOSURE  
1980 BASE YEAR

	<u>Labor Force</u>	<u>Total Employment</u>	<u>Unemployed</u>	<u>Unemployment Rate</u>
Utah State				
Actual	618,818	585,331	33,488	5.4%
TEAD Closure	618,818	576,230	42,589	6.9%
Wasatch Front				
Actual	406,158	384,215	21,943	5.4%
TEAD Closure	406,158	376,628	29,530	7.3%
Salt Lake County				
Actual	284,957	270,429	14,528	5.1%
TEAD Closure	284,957	266,586	18,371	6.5%
Tooele County				
Actual	8,657	8,156	501	5.8%
TEAD Closure	8,657	4,504	4,153	48.0%
Weber County				
Actual	63,490	59,156	4,334	6.8%
TEAD Closure	63,490	59,115	4,375	6.9%

Note:

<sup>1</sup>Using an employment multiplier of 1.5 for estimation only.

Source: Utah Department of Employment Security; and Haworth and Anderson, Inc.

\*\*\*\*\*

Over the past five years Utah employment has been expanding by 4.7% per year, while the labor force has been growing at 4.2% per year. As a result, the unemployment rate has been steadily declining. If it is assumed that employment opportunities will continue to rise approximately 0.5% faster than labor force growth in the near term, the 4,137 primary civilian workers and 4,964 secondary workers could be absorbed into the local economy in four to six years, assuming no out-migration. Skilled workers would probably be absorbed much sooner than unskilled workers, however.

### 3.3 Personal Income

#### a. Continued Depot Operation

Tooele Army Depot has an annual payroll of \$84,461,860 for 4,137 employees. These payrolls impact local economies dependent on employee residence, as shown in Table 78.

TABLE 78  
GEOGRAPHIC DISTRIBUTION OF TEAD PAYROLLS  
1980  
(\$000)

	<u>Total Payrolls</u>	<u>TEAD Payrolls</u>	<u>TEAD as %</u>
Utah State	7,345,961	84,462	1.2
Wasatch Front	5,371,622	81,928	1.5
Davis County	640,909	0	--
Morgan County	14,216	0	--
Salt Lake County	3,971,301	26,183	0.7
Tooele County	151,392	54,900	36.3
Weber County	593,804	845	0.1
Utah County (Provo)	759,848	2,534	0.3

Source: TEAD Finance and Accounting Division; and Haworth and Anderson, Inc.

\*\*\*\*\*

The majority of TEAD direct employment is in Tooele County, amounting to 36.3% of local payrolls. Salt Lake County receives over \$26 million in TEAD payrolls, amounting to 0.7% of the county total.

After deductions for taxes, savings, and social security, the residual payroll figure is disposable income available for spending. The injection of this income into the economy creates additional income as these funds move through the economy. The statewide secondary income effect of Depot operation is derived by use of an income multiplier of 1.7. As with the employment multiplier this figure was taken from an earlier in-depth study of TEAD's economic impact on the State of Utah.<sup>159</sup> The same limitations regarding the use of the income multiplier as were noted in the discussion of employment apply here. The Wasatch Front region is assumed to absorb 72% of the induced statewide impact in accordance with its share of state economic activity. Salt Lake County is estimated to absorb 73% of the Wasatch Front induced impact on the same basis. The estimates for the other Wasatch Front counties

are formed by distributing the remaining impacts among the counties according to the ration of direct income lost. The residual is allocated to the rest of the state. Table 79 summarizes the current impact of Depot operation on both direct and induced disposable income.

Of the total \$115 million impact, Tooele County realizes 46%, while the next largest beneficiary, Salt Lake County, garners 40%. Salt Lake County's relatively large secondary impact total reflects its position as trade and service center for the region. In spite of this, total impacts of TEAD on Salt Lake County only amount of 1.1% of the county's total payrolls.

#### b. Depot Closure

Total direct employment payrolls in Tooele County would decline by \$84,461,860 with Depot closure, based on FY 1981 payroll figures. Due to the large number of commuting workers and the lack of a large trade and service sector in Tooele County, the income impacts would be felt in the worker's location of residence, as indicated by Table 75.

The actual disposable income that would be lost to local economies is calculated using an average of 20% for federal income tax and social insurance deduction. However, the payment of unemployment benefits by the federal government must be added back to derive total net impacts. Unemployment benefits are estimated using most recent expenditure-per-beneficiary figures in the respective counties. Table 80 summarizes the direct income impact of Depot closure taking these factors into consideration. Table 81 traces the effects of these calculations on induced income in the region, using the 1.7 statewide multiplier and allocation methodology explained previously.

TABLE 79  
CURRENT INCOME IMPACT OF TEAD  
1980  
(\$000)

	<u>Disposable Payrolls</u>	<u>Induced Income</u>	<u>Total Income Impacts</u>
Utah State	67,890	47,523	115,413
Wasatch Front	65,542	34,217	99,759
Salt Lake County	20,946	24,978	45,924
Tooele County	43,920	9,100	53,020
Weber County	676	139	815
Rest of State	2,027	13,306	15,333

Source: Haworth and Anderson, Inc.

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TABLE 80  
DIRECT INCOME IMPACT OF DEPOT CLOSURE  
(\$000)

	<u>Utah State</u>	<u>Wasatch Front</u>	<u>Salt Lake County</u>	<u>Tooele County</u>	<u>Weber County</u>	<u>Utah County</u>
Disposable Personal Income	8,346,088	5,858,829	3,960,146	137,331	897,594	981,951
(minus) TEAD Disposable Payroll	67,890	65,542	20,946	43,920	676	2,027
(plus) Unemployment Benefit	6,924	6,741	2,032	4,635	74	183
Residual Disposable Income	8,285,122	5,800,028	3,941,232	98,046	896,992	980,107
Net Direct Income Impact	-60,966	-58,801	-18,914	-39,285	-602	-1,844
% of Disposable Income	0.7	1.0	0.5	28.6	0.1	0.2

Source: Utah Department of Employment Security," Volume III Labor Market Information;" U.S. Bureau of Economic Analysis, "Personal Income Estimates;" and Haworth and Anderson, Inc.

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TABLE 81  
PROJECTED LOSS OF DISPOSABLE INCOME DUE TO DEPOT CLOSURE  
(\$000)

	<u>Net Direct Income Lost</u>	<u>Induced Income Lost</u>	<u>Total Income Lost</u>
Utah State	60,966	42,676	103,642
Wasatch Front	58,801	30,727	89,528
Salt Lake County	18,914	22,431	41,345
Tooele County	39,285	8,172	47,457
Weber County	602	124	726
Rest of State	1,844	11,949	13,793

Source: Haworth and Anderson, Inc.

\*\*\*\*\*

The multiplier used for induced income including the income generated by purchases of goods and services by TEAD. This is the reason for the large income effect allocated to the remainder of the state in Table 81. Since these effects are scattered throughout the state, discontinued these expenditures would not have large localized impacts outside of the Wasatch Front region.

The income lost due to closure of TEAD would amount to over \$103 million statewide. Table 82 summarizes the significance of this loss on the areas affected. Tooele County would suffer the most under this scenario, losing 34.5% of local income flows.

TABLE 82  
TOTAL DISPOSABLE INCOME IMPACTS OF DEPOT CLOSURE  
(\$000)

	<u>Actual Disposable Income</u>	<u>Total Direct &amp; Induced Losses</u>	<u>Disposable Income After Closure</u>	<u>Percent Change</u>
Utah State	8,346,088	103,642	8,242,446	-1.2
Wasatch Front	5,858,829	89,528	5,769,301	-1.5
Salt Lake County	3,960,146	41,345	3,918,801	-1.0
Tooele County	137,331	47,457	89,874	-34.5
Weber County	897,594	726	896,868	-0.1
Rest of State	2,487,259	13,793	2,473,466	-0.6

Source: U.S. Bureau of Economic Analysis, "Personal Income Estimates;" and Haworth and Anderson, Inc.

\*\*\*\*\*

### 3.4 Taxes

#### a. Continued Depot Operation

A major tax impact of continued Depot operation is the sales tax generated by sales to TEAD employees. Sales tax estimates are made by applying the local tax rate to the primary and secondary disposable income generated by TEAD operations, as shown in Table 83.

In dollar amounts the state government would receive the majority of sales tax revenues because the state rate is 4% versus local government rates of 0.75% to 1.0%. The \$4.3 million the state receives is 82.4% of the total sales taxes attributed directly or indirectly to TEAD operations. Tooele County receives \$366,000 or 58% of its total sales taxes from the Depot and support activities.

The income tax is the other major tax source impacted by the Tooele Army Depot. Taxes on total incomes generated by TEAD amount to over \$2.4 million. These funds are distributed back to the school districts through the Uniform School Fund, so the amount of income taxes generated in an area is not the same as the amount received from the state school fund. Income taxes generated by TEAD employment by geographic area are shown in Table 84.

TABLE 83  
ESTIMATED RETAIL SALES TAX RECEIPTS FROM OPERATION OF TEAD  
1980  
(\$000)

	<u>1980 Tax Receipts</u>	<u>TEAD Tax Impact</u>	<u>TEAD as %</u>
Utah State	347,643	4,247	1.2
Salt Lake County	43,020	423	1.0
Tooele County	630	366	58.1
Weber County	7,540	8	0.1
Rest of State	26,632	105	0.4

Source: Utah State Tax Commission, "Twenty-Sixth Biennial Report," July 1980-June 1981, and Haworth and Anderson, Inc.

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TABLE 84  
INCOME TAXES GENERATED BY TEAD EMPLOYMENT  
(Primary and Secondary)  
1980  
(\$000)

	<u>Income Taxes</u>	<u>TEAD Impact</u>	<u>TEAD as %</u>
Utah State	202,302	2,428	1.2
Salt Lake County	106,316	1,063	1.0
Tooele County	4,099	1,414	34.5
Weber County	16,263	16	0.1
Rest of State	75,624	454	0.6

Source: Utah State Tax Commission, "Utah Statistics of Income 1979 Return Year," May, 1981; and Haworth and Anderson, Inc.

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The distribution of these revenues and their efforts on school districts are addressed in subsection 7.4 below. Schools also receive from the federal government Public Law 874 funds or impact aid for students whose parents work on the Depot. This payment is in lieu of property taxes which are not levied against federal government property. These are also discussed in subsection 7.4.

Since property taxes are not collected on Depot property, the existence of the Depot, as with other federal land, implies an amount of foregone property tax revenues. While no assessed value figures are available for Depot land, an estimate can be developed using the ratio of private land acres versus private assessed value for 1980. Private acreage in Tooele County numbers 517,554 acres and private assessed (not market) value was \$119,571,050. Applying the derived \$230.9 assessed value per acre figure to the 42,388 non-contaminated acres on the Depot yields an estimated value of \$9,787,389.

The amount of property taxes foregone by local governments in Tooele County due to the operation of TEAD may be calculated by applying the millage levy of 49.85 mills to the value figure. This yield is \$487,901 in foregone taxes.

#### b. Depot Closure

The decline in retail sales from Depot closure would result in a decline in sales tax receipts to the state and local governments, as shown in Table 85. Depot closure would result in 1.4% decrease in sales tax revenues to the state general fund. Tooele County would suffer a dramatic sales tax loss, with revenues declining by 58.1%, but no other county would endure a significant decrease. The state government would bear 82.4% of the total revenue loss of \$85.2 million.

TABLE 85  
IMPACT OF TEAD CLOSURE ON SALES TAX RECEIPTS  
(\$000)

	<u>Tax Rate</u>	<u>1980 Tax Receipts<sup>1</sup></u>	<u>Receipts After Closure</u>	<u>Percent Change</u>
Utah State	4.0%	347,643	343,396	-1.2
Salt Lake County	1.0%	43,020	42,597	-1.0
Tooele County	0.75%	630	264	-58.1
Weber County	1.0%	7,540	7,532	-0.1
Rest of State	0.75%	26,632	26,527	-0.4

Note:

<sup>1</sup>Adjusted from fiscal year to calendar year basis.

Source: Utah State Tax Commission, "Twenty-Sixth Biennial Report," July 1980 to June 1981; and Haworth and Anderson, Inc.

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The reduction of employment with Depot closure would reduce unemployment compensation tax receipts to the state by about \$1,068,000. At the same time increased unemployment would result in an increase in unemployment compensation payments of an estimated \$6.9 million. Since these tax revenues flow to the state, they do not impact local government budgets. Table 86 allocates lost tax revenues based on loss of employment in the major counties.

State income tax receipts are collected by the state and distributed to school districts through the Uniform School Fund. Revenue losses at the state level would reach nearly \$2.4 million and would impact county receipts for schools as indicated in Table 87. For further discussion of impacts on school funding, see section 7.4 below.

TABLE 86  
IMPACT OF DEPOT CLOSURE ON UNEMPLOYMENT TAX RECEIPTS<sup>1</sup>  
(\$000)

	<u>1979-80 Unemployment Tax Receipts</u>	<u>Tax Receipts After Closing</u>	<u>Percent Change</u>
Utah State	53,468	52,399	2.0
Salt Lake County	21,403	21,018	1.8
Tooele County	823	361	56.2
Weber County	3,274	3,271	0.1
Utah County (Provo)	4,408	4,395	0.3

Note:

<sup>1</sup>Based on decline in number of employed individuals.

Source: Utah State Tax Commission, "Twenty-Sixth Biennial Report," July 1980 to June 1981; and Haworth and Anderson, Inc.

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TABLE 87  
IMPACT OF DEPOT CLOSURE ON INCOME TAX RECEIPTS<sup>1</sup>  
(\$000)

	<u>1980 Personal Income Taxes</u>	<u>Tax Loss from Closure</u>	<u>Income Taxes After Closing</u>	<u>Percent Change</u>
Utah State	202,302	2,428	199,874	-1.2
Salt Lake County	106,316	1,063	105,253	-1.0
Tooele County	4,099	1,414	2,685	-34.5
Weber County	16,263	16	16,247	-0.1
Rest of State	75,624	454	75,170	-0.6

Note:

<sup>1</sup>Based on the decline in disposable income.

Source: Utah State Tax Commission, "Utah Statistics of Income, Individual Income Tax Returns 1979 Return Year," May, 1981; and Haworth and Anderson, Inc.

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If closure of TEAD were to cause the non-contaminated land on the Depot to revert to private ownership, 42,388 acres would be returned to the tax rolls. In line with the analysis in the previous section, additional taxes of \$487,901 would be available to local governments. This estimate includes both land and buildings but is necessarily only a rough approximation.

#### 4. Land Use

##### 4.1 Continued Depot Operation

###### a. North Area

Land use and activity areas on TEAD-N are shown on the installation map on page 17. Table 88 lists the major land uses and the approximate acreage devoted to each type of use. A description of the buildings and structures located within these areas is provided in subsection E of Section I. The following discussion briefly outlines the activities taking place within the designated land use areas.

TABLE 88  
LAND USE ON TEAD-N

<u>Use</u>	<u>Acreage</u>
1. Igloo Storage Area	9,930
2. Open Revetment Storage Area	2,890
3. Open Storage Areas	730
4. Buffer Areas	6,705
5. Ammunition Demolition	1,605
6. Ammunition Maintenance Areas	310
7. Above-ground Magazines	130
8. Chemical Range	380
9. Rifle Range	930
10. Spoil Area	55
11. Land Fill	115
12. Warehouse and Supply Area	345
13. Maintenance Area	195
14. DPDO yard	35
15. Industrial Area	220
16. Administrative Areas	50
17. Medical Area	20
18. Troop Housing and Support Area	30
19. Recreational Areas	50
20. Utility Services Area	5
Total	24,730

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The igloo storage area, located within the central portion of the Depot, constitutes the predominant land uses at TEAD-N. Various munitions are transported to and stored in this area by truck or trail. The rail system serves various loading areas, which are linked to the 960 storage igloos (over 1.8 million square feet of storage) by an internal road system.

The open revetment storage area consists of open earth revetments which have been used in the past for munitions storage. With the exception of sporadic inert materials storage (packing cases, empty cannisters) no use is presently made of this area, which is served by an internal road system.

The open storage areas which are located around the warehouse and supply area, maintenance area, and DPDO yard are used for storing various types of material and military equipment. Material and equipment are stored, generally on a temporary basis, for rehabilitation or future permanent storage. A grid road network also serves these areas, which are predominantly prepared earth surfaces.

The buffer areas are essentially non-use areas which extend along the periphery of the Depot. The primary purpose of these areas is to provide open buffers from the munitions storage areas. The reserve training maneuver areas are located within the southern buffer area.

The ammunition demolition area is located in the southwestern corner of the Depot. This area is used to dispose of obsolete munitions materials by demolition. The area consists of control facilities and open areas where munitions are buried for demolition. A burning area for dunnage and other contaminated materials is also located in the demolition area. Once these materials are burned, these trench pits are overcovered with soil.

Ammunition maintenance areas include three areas located on the southwestern periphery of the igloo storage area. These areas contain maintenance buildings and loading areas served by rail and truck where maintenance of various munitions types ranging from small arms to guided missiles takes place.

Above-ground magazines are also located along the southwestern periphery of the igloo storage areas. This area consists of concrete block and reinforced block buildings which are used for munitions storage. Rail and truck access is provided to the magazines.

The chemical range is located along the western portion of the southern boundary of TEAD-N. This area is no longer in active use (except for flare usage) because the safety cone extends beyond the Depot boundaries.

The rifle range is located near the western periphery of the Depot. The range is used infrequently for small weapons (up to M-60 machine gun) target practice. The range is under control of the 96th ARCOM (stationed in Fort Douglas, Utah) and is available 24 hours per day 365 days per year. Usage in recent years has amounted to five to 10 days per year.

The spoil area is a repository for excess and unsuitable soil material.

The landfill is located south of the warehouse and supply areas. It is used to dispose of non-toxic and uncontaminated solid waste materials. Such materials are deposited in pits and overcovered by soil.

Warehouses within the warehouse and supply area are used for long-term storage of specialized vehicles. They have controlled humidity and a series of metal tanks with sealed doors which allows a controlled atmosphere for long-term storage. There are 10 warehouse "tank farms" used for long-term storage of specialized vehicles. The supply area contains 26 large general-purpose warehouses for additional storage of equipment and supplies at TEAD-N. To the north of this area is located a modern tank repair facility used to support engineer equipment rebuilding. The area is served by both truck and rail.

Several maintenance buildings are located within the maintenance area. These facilities accommodate paint dunnage, equipment maintenance, repair, handling inspection, and ammunition. Altogether there are 877,776 square feet of building space within this area, which is served by both truck and rail.

The DPDO yard, located adjacent to the eastern side of the warehouse and supply area, consists of an open storage area and several steel buildings. This area is used for temporary storage of surplus material. The area is provided with rail and truck access.

The industrial area consists of several warehouse structures which are used for Depot maintenance support activities. These activities include buildings and grounds; planning and administrative functions; electrical utilities, and sanitation systems maintenance; automotive, rail equipment and mobile equipment maintenance; pest control; tool cribs; etc. The area between the building area (east of the supply and maintenance road) and the eastern Depot boundary is undeveloped.

There are two administrative areas used for general Depot administrative support functions. The headquarters area is located adjacent to and south of the industrial and medical areas. This area also contains the fire station, a community club, and an officers' housing area. The other administrative area is in the southeast corner of the Depot, which houses the security division and other administrative functions.

The medical area consists of a complex of buildings housing the Depot health facilities.

The troop housing and support area is used for troop housing during reserve forces training. This area contains 25 two-story barracks, five mess halls, and an administration buildings. The reserves also use the rifle range and two maneuver areas on the Depot. The maneuver areas are located west of the main administrative area and between the Ethiopian Dam and the chemical firing range. No permanent facilities are located within these maneuver areas.

The most important of the recreational areas at TEAD-N is located in the southeast corner of the Depot. The NCO Club, credit union, TEAD travel club, and other facilities are located within this area. A gymnasium and pool are located adjacent to this use area in the administration area. Other recreational facilities are located in several other parts of the Depot.

The utility services area contains one of the Depot's water tanks.

The existing land use activities at TEAD-N and those proposed under the Master Plan are in compliance with federal, state, and local land use regulations and guidelines. Proposed new construction under the Master Plan is detailed in subsection E of Section I; proposed construction would have no appreciable impact on existing uses on Depot land, except in the case of the proposed solid waste incinerator. The new incinerator will significantly decrease the intensity of use of the landfill at TEAD-N.

There are no identified conflicts between on-Depot activities and off-Depot land uses. The Tooele County and proposed Tooele City zoning maps designate the areas surrounding the Depot as low-intensity use areas. The area along the eastern and northeastern portions of the Depot are designated for manufacturing uses which are compatible with Depot activities. The encroachment to the Depot by incompatible land uses. Site plan and building permit review by the county can limit the potential encroachment by residential structures adjacent to potentially hazardous areas.

Two areas of potential encroachment to the Depot include a western bypass road for Tooele City and residential development northwest of the troop housing and support area. The bypass road which may require right of way acquisition along the eastern boundary of the Depot is not expected to interfere with Depot activities. The off-Depot housing development is adjacent to a low-use buffer area and should also not interfere with Depot operations.

#### b. South Area

Land use and activity areas on TEAD-S are shown on the installation map on page 25. Table 89 lists these land uses and the approximate acreage associated with each. A description of the buildings and structures located within these areas is provided in subsection E of Section I. The following discussion briefly outlines the activities taking place within these land use areas.

TABLE 89  
LAND USES ON TEAD-S

<u>Use</u>	<u>Acreage</u>
1. Open storage and ammunition area	4,348
2. Igloo toxic storage area	1,151
3. Toxic storage area	235
4. CAMDS area	700
5. Contaminated area (buried explosives and chemicals)	1,934
6. Spoil area	443
7. Landfill area	54
8. Abandoned landfill area	7
9. Administration, shops, and warehouse area	755
10. Service areas	54
11. Private housing area	26
12. Grazing areas	830
13. Buffer areas	8,822
14. Cemetery	5
Total	19,364

\*\*\*\*\*

The open storage and ammunition area is located in the central portion of the Depot and is the largest of the identified land use areas. It consists of open pad storage, warehouses, and off-load facilities. Rail and truck access is provided to the area. The use intensity is relatively low and the southwestern portion of the area is underdeveloped.

The igloo toxic storage area is located adjacent to the northwestern portion of the open storage and ammunition area. There are 140 reinforced-concrete standard construction magazines and 68 steel arch magazines (recently constructed) located in this area. All igloos are earth-covered. Rail and truck also serve this area. The concrete igloos account for approximately 300,000 square feet of storage area, and the newly constructed steel arch igloos account for approximately 150,000 square feet.

The CAMDS area is located adjacent to the igloo and open storage areas in the west central portion of the Depot. The CAMDS facility is used for demilitarization of chemical munitions and storage containers and the detoxification of nerve agents and mustard agent fills. This activity is limited to a complex of structures enclosed within a 10-acre fenced site. With the exception of a newly constructed structure outside of the fence to the south and the facility itself, the CAMDS use area is undeveloped. The facility is served by rail and street access. A helipad is located adjacent to the east of the perimeter fence.

The contaminated area (buried explosives and chemicals) is located between the CAMDS facility, the open storage and ammunition area, and the southern Depot perimeter fence. This area consists of former demolition and burying areas, mustard holding areas, a mortar pit, and numerous other covered pits. A complete listing is contained in Table 10 on page 36.

The spoil area is located along the central portion of the northern boundary of the Depot. It is a repository for excess and unsuitable soil material.

The existing landfill area is located southeast of the administration and warehouse area. It is used for disposal of general sanitary waste materials.

An abandoned landfill area is located southwest of the administration and warehouse area.

The administration, shops, and warehouse area is located in the northeast corner of the Depot. Aside from CAMDS, this is a major activity area on TEAD South. The developed portion of the area is located in its southwestern corner, with the remainder being essentially undeveloped. This area contains warehouses, a dispensary, administrative facilities, a fire station, other personnel support facilities, a boiler plant, and maintenance facilities. The administrative, warehousing, and maintenance functions contained in this area are on a considerably smaller scale than those at TEAD North.

Service areas are located within the northwestern portion of TEAD-S and to the northwest of the administrative, shops, and warehouse area. They consist of wells and reservoir sites.

The private housing area, located in the northeast portion of the South Depot, consists of 26 units (13 structures) of privately-owned housing. This housing is the remaining portion of government-constructed wherry housing that was sold to private ownership.

The grazing areas are located north of the open storage and ammunition area and west of the administration area. This land is undeveloped and is leased to private individuals for cattle grazing.

Buffer areas, which make up the greatest acreage on the South Area, are located along the eastern, southern, western, and northern boundaries of the Depot. They are essentially non-use areas intended to buffer the munitions storage and activity areas. A firing range is located in the north buffer area, south of the cemetery. It is currently closed and has deteriorated to the point that it is unusable.

The cemetery is located in the north central portion of the Depot. It is fenced, sterilized, and graveled.

The existing land use activities at TEAD-S and those proposed under the Master Plan are in compliance with federal, state, and local land use regulations and guidelines. Proposed new construction under the Master Plan is detailed in subsection E of Section I; proposed construction would have no appreciable impact on existing uses on Depot land. The land uses surrounding the South Area are of low intensity, consisting primarily of grazing. Human habitation in the immediate vicinity of the Depot is limited to a ranch northwest of the Depot, the community of Faust (five houses) approximately five miles south of the Depot, and the communities of Clover, Onaqui, and St. John approximately two miles northwest of the Depot. Existing Depot activities have no substantial impact on surrounding land uses; nor would any activity proposed in the Master Plan have any such impact.

Because of the existing zoning surrounding the Depot (MU-40, which requires minimum parcel sizes of 40 acres for homesites) and the relatively low growth potential of the above-mentioned communities, it is not anticipated that there will be any land use encroachments on the Depot. The county requires building permit, occupancy permit, and site plan review prior to building approval or issuance of zoning permits.

#### 4.2 Depot Closure

Depot closure would involve termination of existing activities and deactivation of facilities used in these activities. Particular attention would have to be given to waste disposal, ammunition demolition, and hazardous waste areas under de-activation in order to avoid adverse impacts on human health and safety. This might involve clean-up of contaminated areas or land use controls to avoid certain types of land uses. However, assuming that the contaminated areas were either cleaned up or secured from potential human access, Depot closure would have no adverse land use impacts.

Future use of Depot land in the event of closure cannot be projected at this time. Given the land uses in the immediate vicinity of TEAD-S, it is quite possible that the South Area site would return to grazing use; but this must remain pure conjecture at the present time.

Depot closure would not adversely impact off-Depot land uses of either Tooele County or Tooele City. It is possible that a portion of the Depot facilities (warehousing, storage utilities, and transportation systems) could be used for industrial development by either the county or the city.

## 5. Transportation

### 5.1 Road Network

#### a. Continued Depot Operation

##### North Area

TEAD North is served by a comprehensive system of on-base roads and railroad lines. There are approximately 241 miles of roads on the North Depot. Hard-surfaced roads (primarily asphalt with some concrete) account for approximately 139 miles and gravel surfaced roads account for approximately 102 miles. Most of the roads are classified as being in excellent or good condition. All roads are controlled and can be closed off to the public.

The primary road system links and provides access within the major activity areas of the Depot. These roads range in width from 18 to 33 feet, with the majority being 22 feet in width. The condition of the primary routes is either excellent or good. The primary system essentially runs from the southeast to the northwest corners of the Depot, with routes through the igloo storage, maintenance and supply, industrial, and administrative areas. The east, north, and northwest gates are linked by the primary system.

The secondary road system predominantly provides lateral access through the igloo storage and open revetment storage areas. The road accessing the igloo storage area is asphalt, surface, 11 feet in width and considered to be in excellent condition. The road accessing the revetment storage area (a low-use area) is gravel, 18 feet in width, and in poor condition. Secondary roads also access the ammunition demolition area and chemical range.

The tertiary system, which consists primarily of gravel-surfaced roads between 12 and 18 feet in width, receives low levels of traffic. Their use is generally limited to special situations requiring access to the perimeter patrol roads and open storage areas.

Parking areas are provided in administrative, medical, troop housing and support, industrial, maintenance, and warehouse and supply areas. Special parking and loading areas are also provided in the ammunition maintenance and above-ground magazine areas as well as the industrial, and warehouse and supply areas. It should be noted that in the industrial and warehouse and supply areas roadway edges are not in all cases well defined with respect to the adjacent parking and equipment ramps. This may present an accident hazard causing conflict between moving vehicles and stationary vehicles or equipment.

The Depot is accessed primarily through three gates. In addition, there are two other gates that are used only for special uses. The main gate, which provides access to SR 36, is located in the southeastern portion of the Depot and is open seven days per week 24 hours per day. A gatehouse within 24-hour security controls access to the main Depot facilities. (Presently access to administration, recreation, and troop areas can be made without passing the guard house.) The north gate and the northwest gates provide access to SR 112. The north gate is open between the hours of 6:30 a.m. and 6:30 p.m. during normal work days and is also controlled by a manned gatehouse. The northwest gate is open and manned in the morning between 6:30 and 7:30 and the afternoon between 4:00 and 4:30 for Depot employee ingress and egress. The main and north gates receive the bulk of the employee and truck traffic into the Depot. The other gates include the ammunition gate at the northeast corner of the open revetment storage area (access to SR 112) and a gate along the western boundary used by 96th ARCOM for access to the firing range (access to SR 59). These gates are open only by special request.

The primary traffic generated by the Depot consists of employees commuter traffic and truck and rail material traffic. The employee traffic is the most significant in terms of overall traffic impact because commuter traffic is concentrated in the half-hour periods before the work day begins (7:30 a.m.) and after the work day ends (4:00 p.m.). As noted above, commuter traffic enters and exists via three gates: main, north, and northwest. The north gate receives the highest percentage of this traffic flow (approximately 43%), followed by the main gate (approximately 37%), and the northwest gate (approximately 20%).<sup>160</sup> This traffic is highly directional and control measures have been implemented to control the inbound morning traffic and the outbound afternoon traffic. In spite of this, traffic does back up and some congestion and conflicts are created between vehicles in the main stream and vehicles either attempting to cross or enter the main stream. This problem occurs primarily in the evening during the half-hour period when employees are homeward-bound.

Although the peak morning and afternoon traffic generated by TEAD-N employees commuting to and from the Depot does not significantly impact the overall capacity of the area-wide road network (SR 36 and SR 112), congestion problems are created in downtown Tooele City. Congestion occurs during both commuter periods but are most pronounced during the afternoon peak when downtown business traffic is also the greatest. North/south traffic flow along SR 36 or Main Street does not generally create a significant congestion problem. The primary problem results from east/west or cross-street congestion, which is attributable to traffic attempting to cross the north/south stream.

The two major intersections for cross-street traffic conflicts and congestion are the intersections of Main Street with First North Avenue and Second North Avenue. First North Avenue is the extension of SR 112 into Tooele City. This route receives a high percentage of the Depot traffic exiting the north gate. Most of the Depot traffic exiting the main gate travels Main Street into or through Tooele City. The Tooele City police chief attributes to Depot traffic a large share of both afternoon traffic congestion and a relatively high incidence of accidents at these intersection.,<sup>161</sup>

The existing road system on the North Depot will not be significantly affected by implementation of the Master Plan. The present system is generally in good to excellent condition and no major improvements are planned. Nor will development under the Master Plan have any significant impact in terms of the traffic generated by the North Depot.

### South Area

The South Area is served by a comprehensive system of road and railroad lines which provide access to all of the major use areas. The system is classified in accordance with the standard classification system used for TEAD North. Presently there are approximately 91 miles of active, maintained roads on the South Depot. Approximately 100 additional miles of roads exist on Depot land that are not under active use at this time. The active road system includes 40 miles of 22-foot medium bituminous surface roads, 34 miles of 18-foot gravel surface roads, 12 miles of 11-foot medium bituminous surface roads, and four miles of 11- to 12-foot gravel surface roads. The paved roads are generally in good to excellent condition, while the gravel roads are generally in poor condition.

Twenty-two-foot medium bituminous surface roads link the main and east gates; the private housing area; the administration, shops, and warehouse area; the toxic storage area; the open storage and ammunition area; the igloo toxic storage area; and CAMDS. Access within the igloo toxic storage area that access the igloo is provided by 11-foot medium bituminous surface roads. The contaminated (explosives and chemicals) area is served by 18-foot gravel roads. The perimeter patrol road is an 18-foot gravel surface road; the patrol road in the southeastern portion of the Depot periodically washes out as a result of runoff from the Mercur Canyon drainage area.

There are two gates providing access to the South Area: a north gate and an east gate. The north gate is presently under active use. Access beyond the private housing area and administration, shops, and warehouse area to the storage areas and CAMDS is limited to authorized personnel only by a security post.

Vehicular traffic flows in and out of the Depot are light as is the average daily traffic flow along SR 73. According to the Utah Department of Transportation, the 1981 ADT between the intersection of SR 36 and the main gate was 740 vehicles per day. Between the main gate and the eastern Tooele County line, the ADT was 310 vehicles per day. This indicates an average traffic flow into and out of TEAD South of approximately 330 vehicles per day. This would include both employee commuter traffic and transport traffic between the North and South Depot areas. This traffic creates no problems with the overall road capacity in the local area.

The Master Plan calls for no expansion of existing transportation systems at TEAD-S and will not significantly increase the traffic generated by the installation.

## b. Depot Closure

Depot closure would involve the deactivation of existing transportation systems and facilities at TEAD-N and TEAD-S and eliminate the vehicular traffic currently generated by the operation of these installations. The share of Depot-generated traffic that presently adds to congestion and accident potential in downtown Tooele City would be eliminated by Depot closure.

## 5.2 Trucking

### a. Continued Depot Operation

#### North Area

Truck traffic entering and exiting the North Depot primarily uses either the main or the northwest gates. The ammunition gate is also used in special cases. Truck traffic does not create any notable problems on the Depot, since it is fairly evenly distributed throughout the day. Although several area trucking firms operate regular schedules to serve the Depot, most traffic is non-scheduled demand traffic. According to the Tooele City Police Chief, Depot-generated truck traffic does create some congestion and accident potential as it moves through the city.

#### South Area

The South Depot does not generate as much truck traffic as the North Depot. The traffic that is generated creates no special problems.

## b. Depot Closure

With Depot closure, the truck traffic currently generated by TEAD-N and TEAD-S would be eliminated. This would have a beneficial impact on congestion and accident potential in downtown Tooele City. It is possible that the elimination of traffic directly serving the Depot might also result in a service reduction to Tooele City. Truck lines that provide regularly scheduled service to Tooele City in serving TEAD-N might reduce service to the city in the event of Depot closure.

## 5.3 Rail Transportation

### a. Continued Depot Operation

#### North Area

Railroad access to the North Depot is provided along the installation's eastern boundary. Both the Western Pacific and Union Pacific railroads provide service to the Depot. The Western Pacific line terminates near the northeast corner while the Union Pacific line is routed south through the southeastern portion of the Depot. There are two access points to the depot, both with lockable gates. One access is located at the northeastern corner of the DPDO yard and the other is located at the northeastern corner of the industrial area.

Rail access is provided to the DPDO yard, the maintenance area, the warehouse area, the industrial area, the ammunition maintenance area, the above-ground magazines, and the igloo storage area. The main line is routed along the southern perimeter and western perimeters of the igloo storage area. It forms a large loop in the northwestern corner of the Depot and returns to the south perimeter line. There are also rail lines along the northern and eastern boundary of the igloo storage area lies between the two areas.

The main rail lines are primarily 75 pound rail, with a short segment or two of 100-pound rail. The main line is classified as being in excellent to good condition. The feeder lines to the major activity areas are also primarily 75-pound rail, which lower to 66-pound rail in the classification yards, DPDO yard, and warehouse, maintenance, and industrial areas. This 66-pound trackage is primarily in fair condition.

Rail cars inbound to or outbound from the Depot are picked up at the entry points by four Army-owned and -operated locomotives. These locomotives move the rail cars between the various loading areas within the Depot. The ammunition or explosive loading facilities are bonded and grounded in accordance with Army regulations. Tracks that pass beneath overhead electrical lines are also grounded. The Depot also contains maintenance facilities for railroad equipment (locomotives, rolling stock, and rail system) and a 150-ton scale.

Rail traffic is distributed throughout the day and has no notable impact on Depot operations. The Western Pacific Railroad schedules trains to the Depot three times per week and the Union Pacific service is available seven days per week. Railcars inbound or outbound access the Depot along the eastern boundary, essentially on a demand basis.

#### South Area

The South Area rail system links with the Union Pacific main line along the western boundary of the Depot. At this point there is a Y track which accesses the depot, and five parallel tracks (approximately 2,300 feet in length) which form the interchange yard. Of the approximately 38 miles of track on the Depot, only 17 miles are presently under active use and maintained in good to excellent condition. The remaining trackage is in poor condition and considered to be unsafe or safe for light and slow traffic only. The rail system ranges from 60- to 100-pound rail, with the main lines primarily 90-pound rail.

#### b. Depot Closure

Closure of the Depot would eliminate the rail traffic currently generated by the Depot. It is possible that this would have some effect on rail service to Tooele City. Although Depot closure would probably not affect Union Pacific scheduling, it might affect Western Pacific scheduling along its branch line into Tooele City.

### 5.4 Air Transportation

#### a. Continued Depot Operation

## North Area

There are no fixed-wing aircraft landing areas on the North Depot. Air cargo that is transported into or out of the Depot is trucked from either Michael Army Airfield at Dugway or Hill Air Force Base south Ogden. The Depot does have a helipad which is located immediately west of the administration area and leased housing area in the southeastern portion of the Depot. The approach to the landing pad is north-south. The landing pad consists of a 100-foot-square asphaltic concrete surface.

## South Area

There are no fixed-wing landing facilities on TEAD South. A 50-foot-square asphaltic concrete helipad is located adjacent to the northeastern corner of the CAMDS facility. The approach zone to the helipad is oriented in a north/south heading.

Major air cargo in and out of the South Area is transported out of Michael Army Airfield in Dugway. Recent cargo has been shipped from Michael Army Airfield through Lookout Pass via the gravel county road to an entry point in the southwest corner of the Depot.

### b. Depot Closure

Depot closure would eliminate the military air traffic currently generated by TEAD-N and TEAD-S. However, neither area currently has any fixed-wing landing facilities to be affected by installation source.

## 5.5 Public Transportation

### a. Continued Depot Operation

There is no public transit service to TEAD North or South. There are, however, car pooling and van pooling programs established by the Depot or privately by Depot employees.

The Depot is served by a privately owned van pool association (Bonneville Transportation Association (BTA)). The BTA is a non-profit corporation consisting of TEAD employees. There are currently 24 vans operated by BTA. Of these, 16 vans are financed through Federal Aid Primary Funds (10% down, 48-month payback, with no interest), and eight are leased with a purchase option. Fares are set by members in charge of the individual vans to cover operational and amortization costs. Each van has a 15-passenger capacity and is operated near capacity. The BTA has no immediate plans for expansion. It is estimated that there are between 15 and 20 privately-owned vans participating in van pools serving the Depot.<sup>162</sup>

According to a car pooling survey in September of 1980, the Depot has a car occupancy ratio at that time of 1.92 (individuals surveyed/vehicles surveyed). Out of a total work force of 3,367 employees, 2,617 individuals surveyed. Of the individuals surveyed, 1,866 individuals shared rides in 614 of the 1,365 vehicles surveyed.

On-Depot taxi service for personnel of TEAD North is provided by two radio-dispatched vehicles (one sedan and one van). Service is provided on a demand basis between the hours of 8:00 a.m. and 3:00 p.m.<sup>163</sup>

#### b. Depot Closure

Since public transit service is not provided to TEAD-N or TEAD-S, the only impact of Depot closure on public transportation would be the dismantling of the car pooling, van pooling, and on-Depot taxi service currently serving the Depot.

### 6. Energy Use

#### 6.1 Continued Depot Operation

Both the North Area and the South Area are served with electricity from a Utah Power and Light plant in Salt Lake City. This plant feeds a substation in Tooele through a 138-KV line. This substation furnishes 44 KV to the North Area, Tooele City, Stockton, and UP&L's Ophir Canyon substation. The Ophir Canyon substation feeds the South Area. The distribution system on Depot land consists of aerial copper and aluminum wires. Back-up generators are placed at critical locations for emergency generation.

The aerial supply lines which feed substations 1 and 2 at TEAD-N could safely handle a load of 12,000 KVA, according to Utah Power and Light Company officials. The combined capacity of the two substations is 7,750 KVA for normal use and 10,322 KVA for maximum use.

Monthly electrical consumption and peak demand at TEAD (both North and South) for the years 1978, 1979, and 1980 are shown in Table 90. Both average peak demand and total consumption decreased slightly between 1978 and 1980. Average monthly peak demand decreased from 5,317 KVA to 5,033 KVA (5.3%), while total annual consumption decreased from 18,680 KWH to 18,638 KWH (0.3%).

TEAD is currently using 0.635% of the total electrical energy being generated by Utah Power and Light Company annually (2,930,000 KWH). By 1986 UP&L estimates that it will generate approximately 3,750,000 KWH. If TEAD's electrical energy consumption were to remain constant through 1986 it would be using 0.496% of UP&L's estimated electrical energy generation in 1986.

Fuel oil is the primary heating source at both TEAD-N and TEAD-S. All shipments are by truck, to six central heating plants in the North Area and to three in the South Area. The Depot has 1,136,760 gallons of emergency storage and two 12,500-gallon tanks for daily use. This emergency supply equals 64 days at maximum use, 81 days at normal use, or 113 days with austere use. In 1980 fuel oil use totaled 1,755,000 gallons in the North Area and 247,305 gallons in the South Area. This represented 0.2% of the total amount of fuel oil distributed by Mountain Fuel Oil during 1980. It is anticipated that the proposed solid waste incinerator at TEAD-N will reduce the annual fuel usage at the North Area by about 30%, reducing the amount used from 1,755,000 gallons to 1,228,500 gallons.

TABLE 90  
MONTHLY ELECTRICAL CONSUMPTION AND PEAK DEMAND AT TEAD  
1979-1980

Month	Peak Demand <sup>1</sup>			Consumption <sup>2</sup>		
	1978	1979	1980	1978	1979	1980
January	5,200	5,440	5,480	1,040	1,616	1,612
February	5,520	5,680	5,560	1,648	1,976	1,812
March	5,320	5,440	5,440	1,512	1,636	1,500
April	5,320	5,280	5,600	1,712	1,816	1,720
May	5,280	5,280	5,440	1,672	1,576	1,576
June	5,280	5,040	5,160	1,576	1,548	1,540
July	5,280	5,160	5,200	1,492	1,508	1,416
August	5,440	5,040	5,280	1,700	1,528	1,632
September	5,280	5,000	4,960	1,584	1,396	1,396
October	5,280	4,880	4,920	1,444	1,348	1,372
November	5,160	5,280	5,160	1,528	1,588	1,464
December	5,440	5,600	5,200	1,772	1,628	1,588

Notes:

<sup>1</sup>Peak demand is in KVA during the month.

<sup>2</sup>Consumption is in 000 KWH per month.

Source: Tooele Army Depot, "Analysis of Existing Facilities/Environmental Assessment Report," Tooele, Utah; May, 1981.

\*\*\*\*\*

Coal is used in some South Area boilers. Consumption of coal in 1980 totaled 820 tons in those heating plants. This consumption is insignificant in view of the fact that Utah is the major underground coal producer west of the Mississippi River, with reserves estimated at 15 billion tons in 1980.

## 6.2 Depot Closure

Closure of the Depot in the near future should result in a net decrease in all forms of energy consumption resulting from existing on-site energy requirements. Reduction of electrical energy used in the region would total some 18,000 or 19,000 KWH annually; regional fuel oil consumption would be reduced by 1.5 to two million gallons or up to 50,000 barrels annually; and consumption of coal would be reduced about 800 tons annually. This total reduction in energy demand would mean that energy (electrical, fuel oil, and coal) would be available for use by others in the region.

## 7. Public Services

### 7.1 Police Protection

#### a. Continued Depot Operation

Security on the Tooele Depot site is provided by the Department of Defense civilian guards and information on guard activities is not generally available to the public. There is no existing mutual aid agreement for police protection between TEAD and Tooele County or nearby cities.

#### b. Depot Closure

Depot closure would eliminate the need for the on-site security service currently provided on the Depot by Department of Defense civilian guards.

Closure of TEAD would also mean a reduction in the demand for police protection service in Tooele County as population declined. Based on current ratios of population to police officers, a loss of 13,977 people (assuming 100% out-migration) would suggest an eventual cutback of up to 20 police officers in the City of Tooele. The Tooele County Sheriff's Office would also be affected.

Depending on actual patterns of out- and in-migration in connection with the search for new employment, the police services in other areas might or might not be affected. If a large number of people migrated from Tooele County to Salt Lake City, the demands for police service in that city might increase.

### 7.2 Fire Protection

#### a. Continued Depot Operation

The Tooele Army Depot has two fire stations--one at TEAD-N and one at TEAD-S. Both stations maintain mutual aid agreements with Tooele County, the cities of Tooele, Grantsville, and Stockton. TEAD has a total of 25 full-time firefighters and one fire chief.

In 1981 there were 13 fires on the Depot, including range, electrical, vehicle, and building fires. Recent fires have been caused by welding operations in smaller buildings on-site. Approximately 75% of the buildings owned and maintained at a Depot are sprinklered.<sup>164</sup>

The North Area fire station is manned by no less than five firefighters at all times. It is equipped with one 1,000-gallon pumper truck, one 750-gallon pumper truck, and one 200-gallon brush truck.<sup>165</sup>

The South Area fire station is manned by no less than three firefighters at all times. It is equipped with one 750-gallon pumper truck, one 200-gallon brush truck, and one dry chemical fire boss unit.<sup>166</sup>

#### b. Depot Closure

Depot closure would presumably eliminate the need for the fire chief and 26 firemen currently serving TEAD-N and TEAD-S, depending on the subsequent use of the property.

Closure of TEAD might also mean a slight reduction in demand for fire protection services in Tooele County as county population declines. If TEAD personnel and their families relocate to other areas, then the need for volunteer firemen would be somewhat reduced. However, even if a substantial number opted to leave Tooele County, the housing and other structures currently requiring fire protection would remain.

It is doubtful that any jurisdiction outside of Tooele County would be noticeably affected by Depot closure in terms of fire protection service, with the possible exception of Salt Lake City.

### 7.3 Parks and Recreation

#### a. Continued Depot Operation

Recreational facilities located at TEAD include a gymnasium (with a basketball court, handball courts, work-out room, game room, equipment room, and sauna-bath); swimming pool (open during the summer); two tennis courts; an archery range; two softball fields; rod and gun club facilities; a golf driving range and putting green; arts and crafts shops; and a movie theatre. In addition, TEAD employees and their families use the recreational facilities near their places of residence and elsewhere in the region.

#### b. Depot Closure

Closure of the Depot would result in on-site facilities not being available for recreational usage in the future. Surrounding communities would experience a decrease in usage of their recreational facilities insofar as people associated with TEAD leave their places of residence due to closure. Surrounding communities which currently house TEAD personnel and their families would experience a loss of tax revenue used to support parks and recreational programs, presumably in roughly the same ratio as the decrease in facility use. This loss of revenue might result in the inability to generate funds for maintenance and improvement of recreational facilities in the area. The City of Tooele is likely to be affected far more dramatically than any other community, as in the case of police and fire services.

### 7.4 Schools

#### a. Continued Depot Operation

Public schools are affected by TEAD operation as insofar as employment opportunities draw families into the area school systems. In 1981 TEAD employees had 3,953 students in local school systems. The cost of educating these students is detailed in Table 91.

TABLE 91  
IMPACT OF TEAD ON SCHOOL DISTRICT EXPENSES  
1980

<u>School District</u>	<u>County</u>	<u>TEAD Students</u>	<u>Expense Per Pupil</u>	<u>Total Expense</u>	<u>% of District Budget</u>
Tooele	Tooele	2,185	\$ 2,057	\$4,494,545	34.0
Weber	Weber	4	1,949	7,796	0.02
Ogden City	Weber	1	1,731	1,731	--
Davis	Davis	29	2,132	61,828	0.08
Granite	Salt Lake	645	1,958	1,262,910	1.1
Murray City	Salt Lake	25	1,837	45,925	0.5
Salt Lake City	Salt Lake	744	2,310	1,718,640	3.2
Alpine	Utah	314	2,057	645,898	1.5
Tintic	Juab	1	6,022	6,022	0.4
Juab	Juab	5	2,608	13,040	0.5
Total		3,953		\$8,258,335	

Source: U.S. Department of Education, Utah Foundation, "Statistical Review of Government of Utah," 1981 edition.

\*\*\*\*\*

Using per-pupil expense factors, the impact on school budgets totals \$8,258,335. The greatest impact is on the Tooele School District, amounting to \$4.5 million or 34% of its budget.

The school districts do collect property taxes from residents in support of schools. The impact of TEAD employees on these revenues is shown in Table 92. Based on per-pupil tax receipts, the total impact is \$3,063,147.

TABLE 92  
PROPERTY TAX IMPACT OF TEAD

<u>County</u>	<u>Total School Property Tax</u>	<u>TEAD Employees Impact</u>	<u>% of Tax Collections</u>
Tooele	3,165,470	998,545	31.5
Weber	18,299,378	2,795	--
Davis	29,831,820	22,127	0.07
Salt Lake	109,127,836	1,729,322	1.6
Utah	26,341,132	306,778	1.2
Juab	1,030,086	3,580	0.4
Total		3,063,147	

Source: U.S. Department of Education, Utah Foundation, "Statistical Review of Government in Utah," 1981 edition.

\*\*\*\*\*

Local school districts also derive revenue from state distribution of the income tax. Distributions to local school districts during the 1979-80 school year averaged \$890 per student. Table 93 identifies the amount of these shared revenues attributable to operation of TEAD.

Finally, operation of TEAD has an impact on school districts in the form of federal impact aid. This aid has been given in the past to school districts to compensate for the impact of increased enrollments caused by employment at federal installations. It is approximately 25% of the actual per-pupil cost. Table 94 summarizes the amounts of federal impact aid generated for TEAD-related students. It should be noted that this aid program is being phased out and may not be available at all in future years.

TABLE 83  
TEAD IMPACT ON STATE-SHARED INCOME TAX RECEIPTS  
(\$000)

	<u>1979-80 School Funding</u>	<u>TEAD- generated Revenue</u>	<u>% of Budget</u>
Tooele County	13,219	1,945	14.7
Salt Lake County	266,595	1,258	0.5
Weber County	58,801	4	0.0
Davis County	77,895	26	0.0
Utah County	42,639	279	0.7
Juab County	4,348	5	0.1
Total	463,497	3,518	0.8

Source: U.S. Department of Education, Utah Foundation, "Statistical Review of Government in Utah," 1981 edition.

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TABLE 94  
FEDERAL IMPACT AID FROM TEAD OPERATION  
1980

<u>District</u>	<u>County</u>	<u>Allocation</u>
Tooele	Tooele	\$177,647
Weber	Weber	267
Ogden	Weber	65
Davis	Davis	1,902
Granite	Salt Lake	42,013
Murray City	Salt Lake	1,586
Salt Lake City	Salt Lake	4,933
Alpine	Utah	20,692
Tintic	Juab	66
Juab	Juab	355
Total		\$249,526

Source: U.S. Department of Education.

\*\*\*\*\*

Total school district revenue attributed to the existence of TEAD operations thus amounted to \$6.8 million in 1980 (see Tables 95 and 96), or 1.85 of the total school funding in the impacted counties. In every case except for Salt Lake County, the revenues derived did not match the per-pupil expenditure total. Total expenditures for TEAD-related students amounted to \$8.3 million in 1980.

b. Depot Closure

Closure of the Tooele Army Depot would decrease enrollment, assuming that unemployed workers would leave the area, by 3,953 students. This is a small portion of the 196,098 pupils enrolled in the districts impacted by TEAD. However, the decline would fall heaviest on the Tooele District where the 2,185 students that would be lost make up 3.5% of district enrollment. In

TABLE 95  
SUMMARY OF MAJOR IMPACTS ON SCHOOL DISTRICTS FROM TEAD

	<u>Additional Expense</u>	<u>Property Tax Revenue</u>	<u>Income Tax Revenue</u>	<u>Federal Impact Aid</u>	<u>Total Additional Revenue</u>
Tooele County	4,494,595	998,545	1,944,650	177,647	3,120,842
Salt Lake County	3,027,475	1,729,322	1,258,460	48,532	3,036,314
Weber County	9,527	2,795	4,450	332	7,577
Davis County	61,828	22,127	25,810	1,902	49,839
Utah County	645,898	306,778	279,460	20,692	606,930
Juab County	19,062	3,580	5,340	421	9,341
Total	8,258,335	3,063,147	3,518,170	249,526	6,830,843

Source: Haworth and Anderson, Inc.

\*\*\*\*\*

TABLE 96  
TEAD-GENERATED SCHOOL REVENUES AS PERCENTAGE OF SCHOOL FUNDING  
1980  
(\$000)

	<u>Total School Funding</u>	<u>TEAD Impact Revenues</u>	<u>% of Total School Funding</u>
Tooele County	13,219	3,121	23.6
Salt Lake County	174,177	3,036	1.7
Weber County	58,801	8	--
Davis County	77,895	50	0.06
Utah County	42,639	607	1.4
Juab County	4,348	9	0.2
Total	371,079	6,831	1.8%

Source: Haworth and Anderson, Inc.

\*\*\*\*\*

numbers, Salt Lake County schools also lose a significant amount of enrollment. However, the 1,414 students that would be lost is only 1.5% of enrollment in Salt Lake County. Under the worst-case scenario Tooele County would have to close three of its 11 elementary schools, one of its four high schools, and cut back staff at its only junior high school.

Such an enrollment decline would cut state-shared school revenues by the amounts shown in Table 93.

Property tax revenues in the area (particularly Tooele County) would suffer because of the depressed local economy after closure and a resultant decline in property values. However, losses in property tax revenues would be substantially mitigated because tax payments would be made on real property even if properties vacated move into foreclosure proceeding.

In addition, Depot closure would result in the loss of federal impact aid to school districts. These payments totaled \$249,526 during 1981, distributed to school districts which enrolled children of TEAD employees. The distribution is detailed in Table 94.

## 7.5 Health Services

### a. Continued Depot Operation

Health services for the Depot are provided by a health clinic at TEAD-N, which employs 32 civilians and two military personnel. These facilities provide emergency first aid treatment of injuries occurring on the Depot. This facility is not a hospital and must refer patients to off-base community hospitals. These referrals are made quite often in cases requiring specialized diagnostic procedures or sophisticated treatment. The majority of referrals are made to Salt Lake City hospitals.

The Depot's Master Plan calls for the construction of a new medical clinic to replace the existing clinic. The new building will contain 9,600 square feet of space and include a pharmacy, an out-patient facility, an ambulance dock, and an equipment room. It will be located west of the existing clinic. Hospital patients will continue to be referred to off-Depot facilities.

Based on the most recent figures available, hospital admissions by Tooele County residents number 136 per 1,000 population. However, only 29% of these admissions are to facilities within Tooele County. The existence of the Tooele Army Depot contributes to the support of an estimated 13,977 Tooele County residents. This number of people creates an annual demand for 1,900 hospital admissions and 9,900 patient days. Presumably 500 admissions are to Tooele Valley Hospital, with the remaining 1,350 going to Salt Lake City. At the current level, the operations at TEAD support some four physicians in the Tooele area.

## b. Depot Closure

The closure of Tooele Army Depot would decrease both supply and demand for health services. The Depot medical clinic serves the occupational-type injuries and illnesses of TEAD employees. The loss of this facility would not affect health services in off-site areas, as service is not provided to the community at large.

The elimination of TEAD employment would reduce the demand for medical services in Tooele County, assuming these workers would relocate to other areas. Relocation of Depot workers and their families, as well as secondary workers and their families, due to closure of the Depot would reduce Tooele County population by an estimated 13,977, assuming 100% out-migration. The number of hospital admissions corresponding with this population is 1,900, including 500 lost to Tooele County and the remainder lost to Salt Lake County. However, the relocation of TEAD-generated employees from Tooele County would substantially mitigate Salt Lake's potential loss, as many would move to that area in search of employment. Tooele Valley Hospital would suffer a significant decline in patient days, which would delay any plans for upgrading or expanding that facility to capture a greater percentage of resident admissions. In addition, the aggregate decline in population could be expected to result in a loss of four of the nine physicians in Tooele County.

## 8. Human Health

### 8.1 Continued Depot Operations

Tooele Army Depot's primary mission is the storage of ammunition and equipment maintenance. The South Area of the Depot is engaged in storage and maintenance of chemical munitions. Potential health hazards involve operations for demilitarizing or testing munitions, storage of conventional and chemical munitions, and use of solvents and other materials in the maintenance of vehicles. Other functions at TEAD use small quantities of potentially hazardous chemicals which are turned over to the Defense Property Disposal Office (DPDO). This office coordinates the disposal or recycling of hazardous wastes according to procedures outlined in the TEAD Hazardous Waste Management Plan.

The greatest potential for adverse impacts on human health is in the South Area where storage, disassembly, and demilitarization of chemical agents takes place. This area is under tight security and enforces standard operating procedures to minimize dangers. Transportation of existing chemical munitions from storage areas to the plant for processing also has a potential for harmful health effects. In addition, extensive open dumping of chemical munitions in the past has left a large area contaminated in the South Area. Although this area is maintained under tight security these exposed dumps are potentially hazardous.

The Directorate for Ammunition Operations supervises the demilitarization of ammunition and explosives. This is accomplished by detonation, burning, or incineration in the case of small arms ammunition. These activities take place infrequently and must be done under ideal weather conditions. There is a potential danger to employees working on detonations, however, there are procedures followed to mitigate these dangers. In addition, detonation areas are far removed from other activities of the Depot.

The control of contaminated or potentially hazardous areas minimizes the dangers of unauthorized access to these areas. There is no evidence of hazards to the off-base population from these activities, partly due to security procedures and partly due to the lack of population concentrations on the non-military lands adjacent to these areas.

## 8.2 Depot Closure

Closure of the Tooele Army Depot would eliminate these hazards, although the operations herein described would in this case very likely be undertaken at some other location. Some areas, such as the open dumps in the South Area, would have to be maintained in a secure manner indefinitely to avoid contamination of area residents. Tables 8 and 10 in subsection F of Section I of this report enumerate these contaminated areas. If security of these areas is maintained, closure would not endanger the off-site population.

## 9. Historic and Archaeological Resources

### 9.1 Continued Depot Operation

#### a. North Area

TEAD-N has two archaeologically significant sites; (1) a large flat rock (a petroglyph site) which was carved on by both the Late Desert Archaics and the Freemonts; and (2) the eight relatively undisturbed pit dwellings of the Freemont culture. The Freemonts also used the juniper areas of TEAD-N for recreation and hunting; past Depot activities may have disrupted portions of those areas.<sup>167</sup>

The petroglyph is deteriorating due partly to vandalism (chipping on the rock) but more importantly to weathering. Acid rain from the Salt Lake City area is particularly destructive because it dissolves the rock's surface.<sup>168</sup>

The eight Freemont pit dwellings on Depot land are among the most important archaeological resources in Utah because they are the only known evidence of permanent structures of the Freemont culture remaining intact. The site fits the criteria set forth for National Historic Sites.<sup>169</sup> The site is relatively undisturbed, except for some surface collecting because of its location on Depot land. The site is located near the firing range just off the perimeter road and surface collecting might become more prevalent should activity increase.

The Freemont culture's pit housing site and petroglyph site are protected by federal law with continued operation of the Depot. The Federal Antiquities Act of 1906 prohibits removal of Indian artifacts from their in situ location

on federal lands without permission from the Department of the Interior. The National Historic Sites Act of 1935 established a national policy for the preservation of historic sites. Further legislation, the National Historic Preservation Act of 1966, established an advisory council that reviews nominations of sites for recognition and preservation. Finally, Executive Order 11593 states that federal activities will preserve their cultural resources and the Archaeological and Historical Preservation Act of 1974 provided funding for that order.

Activities under the Master Plan at TEAD-N will not disturb any known archaeological sites, through any new construction offers the possibility of disrupting unknown sites.

There are no known significant historic sites on North Depot land.

#### b. South Area

There are no known archaeological sites at the South Area, although it is believed the Indian cultures which occupied Tooele Valley were also present in Rush Valley, especially around Ophir and Mercur creeks. Future excavation for buildings and structures has the potential to disrupt an unknown site.<sup>170</sup>

There are no known significant historic sites existing at TEAD-S. A small cemetery on the Depot has been fenced, sterilized, and graveled. It is not now of historic importance but may become so in the future.<sup>171</sup>

### 9.2 Depot Closure

Depot closure might have an adverse impact on the known archaeological resources at TEAD-N. Security protecting the petroglyph and Freemont pit sites would be eliminated and the risk of disruption would be substantially increased, depending on the future use of Depot land. In addition, if Depot land ceased to be owned by the federal government, the archaeological resources at TEAD-N would no longer be protected by the substantial body of preservation law currently protecting them. The cemetery at TEAD-S would also undergo an increase in the risk of disruption in the event of Depot closure.

On the other hand, it is likely that Depot closure would decrease the likelihood of disruption of presently unknown archaeological resources. Construction of new facilities under the TEAD Master Plan involves a minor risk of damaging such resources.

## 10. Aesthetics

### 10.1 Continued Depot Operation

The aesthetics of Tooele Valley and Rush Valley are affected by the presence of the Depot. Buildings and structures tend to change the view of the valleys. However, the buildings are designed low and do not generally disrupt the view of the mountains. Some would find the layout of the igloo and open storage areas at TEAD-N interesting and aesthetically pleasing.

Proposed changes under the Master Plan would have little additional aesthetic impact.

#### 10.2 Depot Closure

Closure of the Depot would generally have a potentially adverse effect on the aesthetics of the valleys, depending on the use to be made of the facility after closure. If the facility were to lie idle, the planted trees, shrubs, and grasses would die and the buildings might fall into dis-repair and become an eyesore. However, most Depot land would begin to increase its vegetative cover and would be greener in the spring.

APPENDIX A  
FACILITIES AT THE TOOELE ARMY DEPOT

# FACILITIES AT TOOELE ARMY DEPOT

<u>Building Number</u>	<u>Location</u>	<u>Functional Activity Description</u>	<u>Intensity of use</u>
<u>TEAD-N</u>			
<u>Directorate for Administration and Services</u>			
1	Administration #2	Director	Full Time
1	Administration #2	Military Training Officer	Full Time
1	Administration #2	Troop Commander/Enlistment Officer	Full Time
1	Administration #2	Public Affairs Officer	Full Time
1	Administration #2	Classified Document Control	Full Time
1	Administration #2	Mail Room	Full Time
1	Administration #2	Military Personnel Staff NCO	Full Time
7	Administration #2	Installation Community Club	Full Time
8	Administration #2	Depot Equipment Division	Full Time
8	Administration #2	Equipment Management and Accounting	Full Time
8	Administration #2	Office Machine Repair	Full Time
8	Administration #2	Data Systems Maintenance	Full Time
8	Administration #2	Fire Protection	24 hr/day
9	Administration #2	Procurement and Contract Admin.	Full Time
52	Ammo. Main. #2	Tool Crib	Full Time
52	Ammo. Main. #2	Battery Shop	Full Time
55	Ammo. Main. #1	Tool Crib	Full Time
57	Ammo. Main. #1	Millwright's Ammunition Equipment	Full Time
101	Troop HSG/Support	Reserve Forces Training Officer	Full Time
101	Troop HSG/Support	Emergency Plans Coordination	Full Time
153	Troop HSG/Support	Public Affairs Specialist	Full Time
155	Troop HSG/Support	Bowling Alley	Full Time
501	Industrial	Facilities Engineering	Full Time
501	Industrial	Building and Grounds Maintenance	Full Time
501	Industrial	Environmental Coordination	Full Time
501	Industrial	Master Planning	Full Time
501	Industrial	Construction/Maintenance Planning	Full Time
501	Industrial	Utilities Administration	Full Time
502	Industrial	Electrical Utilities Maintenance	Full Time
502	Industrial	Sanitation System Maintenance	Full Time
502	Industrial	Metalworking (buildings)	Full Time
502	Industrial	Preventive Main./Painting (buildings)	Full Time
503	Industrial	Tool Crib	Full Time
503	Industrial	Motor Vehicle Operator Licensing	Full Time
503	Industrial	Parts Room (mobile equipment)	Full Time
506	Industrial	Custodial Contractor	Full Time
507	Industrial	Battery Shop	Full Time
509	Industrial	Roundhouse (internal rail unit)	Full Time
510	Industrial	Tool Crib	Full Time
510	Industrial	Mobile Equipment Maintenance	Full Time
510	Industrial	Rail Equipment Maintenance	Full Time
510	Industrial	Taxi Dispatcher	Full Time
510	Industrial	Materials Handling Equipment Main.	Full Time
511	Industrial	Automotive Equipment Maintenance	Full Time
514	Industrial	Paint Shop (buildings and grounds)	Full Time
516	Industrial	Pest Control (grounds)	Full Time

<u>Building Number</u>	<u>Location</u>	<u>Functional Activity Description</u>	<u>Intensity of use</u>
518	Industrial	Pest Control (railroad)	Full Time
519	Industrial	Tool Crib	Full Time
520	Industrial	Tool Crib	Full Time
522	Industrial	Auto Craft Shop (morale support)	Full Time
595	Maintenance	Civilian Personnel Office	Full Time
602	Maintenance	Tool Crib	Full Time
604	Maintenance	Tool Crib	Full Time
606	Maintenance	Steam Fitting (heating)	24 hr/day
608	Maintenance	Tool Crib	Full Time
611	Maintenance	Tool Crib	Full Time
613	Maintenance	Tool Crib	Full Time
614	Maintenance	Chaplain Office	Full Time
616	Maintenance	Ask Me Center (civilian personnel)	Full Time
617	Maintenance	Millwright's (supply and Maintenance)	Full Time
637	Warehouse/Supply	Tool Crib	Full Time
639	Warehouse/Supply	Tool Crib	Full Time
671	Warehouse/Supply	Publications Supply	Full Time
1000	Administration #1	Reproduction Branch	Full Time
1000	Administration #1	Audiovisual Center	Full Time
1000	Administration #1	Security Division Administration	Full Time
1002	Administration #1	Morale Support Main Office	Full Time
1002	Administration #1	Gymnasium	Full Time
1002	Administration #1	Swimming Pool	Full Time
1002	Administration #1	Directives Management (adjutant div.)	Full Time
1002	Administration #1	Editorial Assistance (adjutant div.)	Full Time
1002	Administration #1	Records Management (adjutant div.)	Full Time
1004	Administration #1	Multi-craft Shop (morale support)	Full Time
1011	Recreation	Outdoor Shop (morale support)	Full Time

TEAD-S

Directorate for Administrative Services

10 SA	Administration	Fire Protection	24 hr/day
10 SA	Administration	Security Supervisor	24 hr/day
108 SA	Administration	Chemical Surety Office & Training	Full Time
126 SA	Administration	Electrical Maintenance (utilities)	Full Time
134 SA	Administration	Mobile Equipment Maintenance	Full Time
135 SA	Administration	Roundhouse (internal rail unit)	Full Time

TEAD-N

Directorate for Ammunition Equipment

1005	Administration #1	Director's Office	Full Time
1005	Administration #1	Ammunition Peculiar Equip. Eng.	Full Time
1005	Administration #1	Chemical Systems Engineering	Full Time
1005	Administration #1	Instrument/Special Project Eng.	Full Time
1005	Administration #1	Research Testing & Manuals Branch	Full Time
1005	Administration #1	Technical Support and Drafting	Full Time
519	Industrial	Pilot Model Shop	Full Time
1376	Ammo. Demolition	Test - Main Control Room	30 days/yr
1377	Ammo. Demolition	Test	30 days/yr

<u>Building Number</u>	<u>Location</u>	<u>Functional Activity Description</u>	<u>Intensity of use</u>
1378	Ammo. Demolition	Test	30 days/yr
1379	Ammo. Demolition	Test	30 days/yr
1380	Ammo. Demolition	Test	30 days/yr
1350	Ammo. Demolition	Incinerator	30 days/yr
1351	Ammo. Demolition	Incinerator	30 days/yr
1352	Ammo. Demolition	Incinerator	30 days/yr
1301	Ammo. Demolition	TV Monitoring Test	2 days/yr
1302	Ammo. Demolition	Saw Shop	2 days/yr
1370	Ammo. Demolition	Storage Munitions	2 days/yr

TEAD-N

Directorate for CAMDS

1002	Administration #1	Director's Office	Full Time
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TEAD-S

Directorate for CAMDS

120 SA	Admin./Shops/Whse.	Engineering Division	Full Time
122 SA	Admin./Shops/Whse.	Warehouse	Full Time
123 SA	Admin./Shops/Whse.	Supply Division	Full Time
539 SA	Open Storage/Ammo.	Analysis Branch	Full Time
539 SA	Open Storage/Ammo.	Change and Shower Facility	Full Time
539A	Open Storage/Ammo.	Lunch Room	Full Time
541 SA	Open Storage/Ammo.	Analysis Laboratory	Full Time
541A SA	Open Storage/Ammo.	Storage Building	Full Time
C3300	CAMDS	Site Water System, Pump House	Full Time
C3301	CAMDS	Site Water System, Water Tower	Full Time
C3302	CAMDS	Helicopter Landing Pad	Full Time
C3308	CAMDS	Director's Site Office	Full Time
C3309	CAMDS	ASL Met Team Office	Full Time
C3310	CAMDS	Plant Administration	Full Time
C3310	CAMDS	Plant Maintenance	Full Time
C3310	CAMDS	Plant Operations Control	Full Time
C3311	CAMDS	Laboratory Support Division Office	Full Time
C3312	CAMDS	Water Softener Building	Full Time
C3320	CAMDS	Site Water System, Water Tower Con.	Full Time
C3325	CAMDS	Concrete Pad	Full Time
C4001	Toxic Storage	Storage Shed	Full Time
C4002	Toxic Storage	Storage Shed	Full Time
C4003	Toxic Storage	Storage Shed	Full Time
C4007	Toxic Storage	Storage Shed	Full Time
C4008	Toxic Storage	Storage Shed	Full Time
C7000	CAMDS	Chemical Unload Compressor Building	Full Time
C7001	CAMDS	Security Guard Module	Full Time
C7002	CAMDS	Clothing Storage Module	Full Time
C7003	CAMDS	Locker Module #1	Full Time
C7004	CAMDS	Respirator Storage Area	Full Time
C7005	CAMDS	Toilet/Office Module	Full Time
C7006	CAMDS	Shower Module #1	Full Time
C7007	CAMDS	Shower Module #2	Full Time

<u>Building Number</u>	<u>Location</u>	<u>Functional Activity Description</u>	<u>Intensity of use</u>
C7008	CAMDS	Protection Clothing Module	Full Time
C7009	CAMDS	Lunch Room	Full Time
C7010	CAMDS	Locker Room	Full Time
C7011	CAMDS	DPE Backup Dress Module	Full Time
C7012	CAMDS	DPE Dress Module	Full Time
C7013	CAMDS	Site Medical Facility	Full Time
C7014	CAMDS	Women's Facility	Full Time
C7017	CAMDS	Women's Facility	Full Time
C7018	CAMDS	Women's Facility	Full Time
C7019	CAMDS	Parts Storage	Full Time
C7025	CAMDS	Dunnage Incinerator Building	Full Time
C7026	CAMDS	Deac Pollution Control Building	Full Time
C7027	CAMDS	Unpack Area Building	Full Time
C7028	CAMDS	ECC Housing	Full Time
C7029	CAMDS	ECC Hydraulic Module	Full Time
C7030	CAMDS	Deac Retart Housing	Full Time
C7035	CAMDS	Control Module	Full Time
C7036	CAMDS	Power Distribution Module	Full Time
C7037	CAMDS	208 Volt Emergency Generator Car	Full Time
C7045	CAMDS	Metal Parts Furnace	Full Time
C7046	CAMDS	PDF, CDS, and BIF Housing	Full Time
C7047	CAMDS	PDF, CDS, and BIF Housing	Full Time
C7048	CAMDS	PDF, CDS, and BIF Housing	Full Time
C7049	CAMDS	PDF, CDS, and BIF Housing	Full Time
C7050	CAMDS	Empty Trailer	Not Used
C7055	CAMDS	Toxic Maintenance	Full Time
C7060	CAMDS	Decon Module #1	Full Time
C7061	CAMDS	Decon Module #1	Full Time
C7065	CAMDS	Utility Housing	Full Time
C7066	CAMDS	Agent Destruct Facility/Bottle Fill	Full Time
C7067	CAMDS	Oil Heater and Valve House	Full Time
C7068	CAMDS	Fuel Oil Storage Tank #1	Full Time
C7069	CAMDS	Fuel Oil Storage Tank #2	Full Time
C7070	CAMDS	Fuel Oil Storage Tank #3	Full Time
C7077	CAMDS	Munition Holding Area (concrete slab)	Full Time
C7078	CAMDS	MHA Barracade	Full Time
C7079	CAMDS	Empty Trailer	Not Used
C7081	CAMDS	Non-toxic Maintenance Shop	Full Time
C7082	CAMDS	Calibration Shop & Parts Building	Full Time
C7083	CAMDS	Munitions Holding Area, Storage Igloo	Full Time
C7084	CAMDS	Monitoring Branch & Quality Control	Full Time
C7090	CAMDS	Equipment Test Facility	Full Time

TEAD-N  
Directorate for Maintenance

L-23	Ammo. Main. #2	Rebuild	Full Time
507	Industrial	Topographical Equipment Rebuild	Full Time
507	Industrial	Welding Shop	Full Time
507	Industrial	Shop Supply	Full Time
507	Industrial	Battery Shop	Full time

<u>Building Number</u>	<u>Location</u>	<u>Functional Activity Description</u>	<u>Intensity of use</u>
520	Industrial	Generator Rebuild #1	Full Time
520	Industrial	Shop Supply	Full Time
520	Industrial	Tool Room	Full Time
520	Industrial	Inspection	Full Time
587	Maintenance	Truck and Trailer Final Out	Full Time
590	Maintenance	Tire Storage	Full Time
594	Maintenance	Paint Storage	Full Time
594	Maintenance	Calibration	Full Time
594	Maintenance	Shop Supply	Full Time
595	Maintenance	Power Generation Equipment Planning	Full Time
595	Maintenance	Secondary Items Planning	Full Time
595	Maintenance	Major Items Planning	Full Time
595	Maintenance	Program Control	Full Time
595	Maintenance	Production Planning and Control	Full Time
595	Maintenance	Vehicle and Power Generation Shops	Full Time
595	Maintenance	Maintenance Management and Director	Full Time
600	Maintenance	Inspection	Full Time
600	Maintenance	Metal Cleaning and Painting	Full Time
600	Maintenance	Power Generation Equipment	Full Time
600	Maintenance	Gas Turbine Section	Full Time
600	Maintenance	Gas Turbine Rebuild	Full Time
600	Maintenance	Pershing Unit Rebuild	Full Time
600	Maintenance	Air Condition Rebuild	Full Time
600	Maintenance	Shop Supply	Full Time
600	Maintenance	Tool Room	Full Time
600A	Maintenance	Storage	Full Time
600B	Maintenance	Storage	Full Time
601	Maintenance	Shop	Full Time
601	Maintenance	Shop Supply	Full Time
601	Maintenance	Quality Assurance	Full Time
602	Maintenance	Inspection	Full Time
602	Maintenance	Generator Rebuild Shop #2	Full Time
602	Maintenance	Shop Supply	Full Time
602	Maintenance	Tool Room	Full Time
602A	Maintenance	Storage/Testing	Full Time
603	Maintenance	Rubber Products	Full Time
603	Maintenance	Millwrights	Full Time
603	Maintenance	Inspection	Full Time
604	Maintenance	Transmission Rebuild	Full Time
604	Maintenance	Power Train Rebuild	Full Time
604	Maintenance	Shop Supply	Full Time
604	Maintenance	Metal Processing	Full Time
604	Maintenance	Tool Room	Full Time
604	Maintenance	Power Train and Special Equipment	Full Time
605	Maintenance	Fabric and Decal Shop	Full Time
605	Maintenance	Production Engineering	Full Time
605	Maintenance	Engineering Support	Full Time
605	Maintenance	Shop Supply	Full Time
607	Maintenance	Welding Shop	Full Time
607	Maintenance	Inspection	Full Time
608	Maintenance	Inspection	Full Time

<u>Building Number</u>	<u>Location</u>	<u>Functional Activity Description</u>	<u>Intensity of use</u>
608	Maintenance	Machine Shop	Full Time
608	Maintenance	Tool Room	Full Time
609	Maintenance	Steam and Radiator Repair	Full Time
611	Maintenance	Body Shop	Full Time
611	Maintenance	Generator Rebuild #3	Full Time
611	Maintenance	Gas Turbine Rebuild	Full Time
611	Maintenance	Shop Supply	Full Time
611	Maintenance	Tool Shop	Full Time
612	Maintenance	Paint Shop	Full Time
617	Maintenance	Tool Room Office	Full Time
617	Maintenance	Metal Cleaning and Paint Office	Full Time
617	Maintenance	Tool Room	Full Time
617	Maintenance	Material Movement	Full Time
617	Maintenance	Power Gen./Support Equip. Supply	Full Time
617	Maintenance	Major/Secondary Item Supply	Full Time
617	Maintenance	Shop Supply Division	Full Time
618	Maintenance	Truck and Trailer Preshop	Full Time
619	Maintenance	Inspection	Full Time
619	Maintenance	Wheeled Vehicle Branch	Full Time
619	Maintenance	Truck and Trailer Rebuild	Full Time
619	Maintenance	Body Shop	Full Time
619	Maintenance	Gamma Goat Rebuild	Full Time
619	Maintenance	Construction Equipment Rebuild	Full Time
619	Maintenance	Power Generation Shop #1	Full Time
619	Maintenance	Shop Supply	Full Time
619	Maintenance	Tool Room	Full Time
619	Maintenance	Metal Cleaning and Painting	Full Time
619	Maintenance	Transmission Testing	Full Time
627	Maintenance	Lunch/Locker Room	Full Time
637	Maintenance	Engine Rebuild Shop and Office	Full Time
637	Maintenance	Fuel and Electric Rebuild	Full Time
637	Maintenance	Automotive Machine Shop	Full Time
637A	Maintenance	Storage	Full Time
637B	Warehouse/Supply	Storage	Full Time
638	Warehouse/Supply	Storage	Full Time
647	Warehouse/Supply	Engine Containers Rebuild	Full Time
674	Warehouse/Supply	Storage	Full Time
675	Warehouse/Supply	Storage	Full Time
752	Open Storage	Power Converter Equipment	Full Time
753	Open Storage	Training Area	Full Time
882	Open Storage	Storage	Full Time

Directorate for Management Information Systems

671	Warehouse/Supply	Directorate Administration	Full Time
671	Warehouse/Supply	Computer Management and Operation	Full Time
671	Warehouse/Supply	Software and System Design	Full Time

<u>Building Number</u>	<u>Location</u>	<u>Functional Activity Description</u>	<u>Intensity of use</u>
<u>Directorate for Quality Assurance</u>			
50	Ammo. Main. #1	Ammunition Operations Surveillance	Full Time
54	Ammo. Main. #1	Conv./Missile Stockpile Rel Branch	Full Time
594	Maintenance	Technical Library	Full Time
594	Maintenance	Receiving and Data Clerk	Full Time
601	Maintenance	Director's Office	Full Time
601	Maintenance	Maintenance Quality Control	Full Time
601	Maintenance	Components Quality Control	Full Time
601	Maintenance	Heavy Mobile Equip. Repair/Inspection	Full Time
601	Maintenance	Power Gen. Equip. Repair/Inspection	Full Time
601	Maintenance	Quality Control Systems & Management	Full Time
608	Maintenance	Machine Shop Inspection	Full Time
630	Warehouse/Supply	Supply Quality Control	Full Time
671	Warehouse/Supply	Ammunition Surveillance Admin.	Full Time

TEAD-S

Directorate for Quality Assurance

520	Open Storage/Ammo.	Chemical Munitions Surveillance	Full Time
595	Maintenance	Resources Management Administration	Full Time
595	Maintenance	Finance and Accounting	Full Time
595	Maintenance	Internal Review and Auditing	Full Time
614	Maintenance	Programming and Budgeting	Full Time
614	Maintenance	Productivity and Planning Management	Full Time
1001	Administration #1	Force Development Division	Full Time

TEAD-N

Directorate for Ammunition Operations

L-21	Ammo. Main. #2	Ammunition Renv Shop	Full Time
L-1 thru L-4	Above Ground Mag.	General Purpose Mag	Full Time
L-5 thru L-12	Above Ground Mag.	General Purpose Mag	Full Time
L-23	Ammo. Main. #2	Maintenance Facility	Full Time
SL-25	Ammo. Main. #2	Lunch Room	Full Time
S-30	Ammo. Main. #1	Flam Mat Storage	Full Time
S-31	Ammo. Main. #1	Ammunition Renv Shop	Full Time
S-32	Ammo. Main. #1	Ammunition Hut	Full Time
S-33	Ammo. Main. #1	Ammunition Demil Facility	Full Time
S-31-1	Ammo. Main. #1	Flam Mat Storage	Full Time
S-36	Ammo. Main. #1	Ammunition Hut	Full Time
S-37	Ammo. Main. #1	Lunch Room	Full Time
S-37-1	Ammo. Main. #1	Flam Mat Storage	Full Time
37-2	Ammo. Main. #1	Storage Shed	Full Time
S-38	Ammo. Main. #1	Ammunition Renv Shop	Full Time
S-39	Ammo. Main. #1	Ammunition Renv Shop	Full Time
S-40	Ammo. Main. #1	Smokeless Powder Mag Bk	Full Time
S-41	Ammo. Main. #1	Smokeless Powder Mag Bk	Full Time
S-42	Ammo. Main. #1	Ammunition Demil Facility	Full Time

<u>Building Number</u>	<u>Location</u>	<u>Functional Activity Description</u>	<u>Intensity of use</u>
S-43	Ammo. Main. #1	Ammunition Demil Facility	Full Time
S-44	Ammo. Main. #1	Ammunition Hut	Full Time
45	Ammo. Main. #1	Ammunition Demil Facility	Full Time
S-46	Ammo. Main. #1	High Explosion Mag Bk	Full Time
S-50	Ammo. Main. #1	Administration General Purpose	Full Time
51	Ammo. Main. #1	Ammunition Renv Shop	Full Time
S-52	Ammo. Main. #1	Dunnage Building	Full Time
S-62	Ammo. Main. #1	Vehicle Storage	Full Time
67	Ammo. Main. #1	Flam Mat Storage	Full Time
S-70	Ammo. Main. #1	General Storehouse	Full Time
S-73	Ammo. Main. #1	Ammunition Renv Facility	Full Time
S-73-1	Ammo. Main. #1	General Storehouse	Full Time
S-76	Igloo Storage	General Storehouse	Full Time
S-79	Igloo Storage	Dunnage Building	Full Time
A-80	Igloo Storage	Flam Mat Storage	Full Time
C-82	Igloo Storage	Storage Shed	Full Time
C-83	Igloo Storage	Ship and Rec Building	Full Time
S-83-1	Igloo Storage	General Storehouse	Full Time
E-84	Igloo Storage	Ship and Rec Building	Full Time
K-94	Igloo Storage	Flam Mat storage	Full Time
S-520C	Industrial	Ammunition Hut	Full Time
S-538	Industrial	Ammunition Demil Facility	Full Time
S-548	Industrial	Ready Building	Full Time
576	Maintenance	General Storehouse (trans. shelter)	Full Time
T-589	Maintenance	Lunch Room	Full Time
S-591	Maintenance	Lumber and Pipe Shed, FE	Full Time
S-592	Maintenance	Hoist House	vacant

TEAD-N

Directorate for Supply

S-620	Warehouse/Supply	Administration General Purpose	Full Time
S-620	Warehouse/Supply	Care and Pres Shop	Full Time
S-620	Warehouse/Supply	Ship and Rec	Full Time
S-621	Warehouse/Supply	General Purpose Warehouse	Full Time
S-621	Warehouse/Supply	Ship and Rec	Full Time
S-621	Warehouse/Supply	General Inst. Building	Full Time
S-621-R	Warehouse/Supply	Public Toilet	Full Time
S-630	Warehouse/Supply	Administration General Purpose	Full Time
S-630	Warehouse/Supply	Ship and Rec	Full Time
S-630	Warehouse/Supply	General Purpose Warehouse	Full Time
S-629	Maintenance	Gasoline Station with Building	Full Time
S-631	Warehouse/Supply	General Purpose Warehouse	Full Time
S-631	Warehouse/Supply	Ship and Rec	Full Time
S-631-R	Warehouse/Supply	Public Toilet	Full Time
S-640	Warehouse/Supply	General Purpose Warehouse	Full Time
S-641	Warehouse/Supply	General Purpose Warehouse	Full Time
S-641-R	Warehouse/Supply	Public Toilet	Full Time
S-647	Warehouse/Supply	Box and Crate Shop	Full Time
S-647	Warehouse/Supply	Care and Pres Shop	Full Time
S-647	Warehouse/Supply	General Purpose Warehouse	Full Time
S-647-S	Warehouse/Supply	Public Toilet	Full Time

<u>Building Number</u>	<u>Location</u>	<u>Functional Activity Description</u>	<u>Intensity of use</u>
S-649	Warehouse/Supply	General Purpose Warehouse	Full Time
S-650	Warehouse/Supply	General Purpose Warehouse	Full Time
S-651	Warehouse/Supply	General Purpose Warehouse	Full Time
S-651-R	Warehouse/Supply	Public Toilet	Full Time
S-654	Warehouse/Supply	Storage Shed	Full Time
655	Warehouse/Supply	Administration General Purpose	Full Time
S-657	Warehouse/Supply	General Purpose Warehouse	Full Time
S-657-R	Warehouse/Supply	Public Toilet	Full Time
S-659	Warehouse/Supply	General Purpose Warehouse	Full Time
S-659	Warehouse/Supply	Radioactive Storage Warehouse	Full Time
S-535	Warehouse/Supply	CAMDS Salt Storage	Full Time
S-660	Warehouse/Supply	General Purpose Warehouse	Full Time
S-661	Warehouse/Supply	Arms Building	Full Time
S-661-R	Warehouse/Supply	Public Toilet	Full Time
S-667	Warehouse/Supply	General Purpose Warehouse	Full Time
S-667-R	Warehouse/Supply	Public Toilet	Full Time
S-669	Warehouse/Supply	General Purpose Warehouse	Full Time
S-670	Warehouse/Supply	General Purpose Warehouse	Full Time
S-671	Warehouse/Supply	General Purpose Warehouse	Full Time
S-671	Warehouse/Supply	Administration General Purpose	Full Time
S-672	Warehouse/Supply	Administration General Purpose	Full Time
S-677	Warehouse/Supply	General Purpose Warehouse	Full Time
S-677-R	Warehouse/Supply	Public Toilet	Full Time
S-679	Warehouse/Supply	General Purpose Warehouse	Full Time
S-687	Warehouse/Supply	General Purpose Warehouse	Full Time
S-687-R	Warehouse/Supply	Public Toilet	Full Time
S-689	Warehouse/Supply	General Purpose Warehouse	Full Time
691	Warehouse/Supply	Care and Pres	Full Time
T-692	Warehouse/Supply	Administration General Purpose	Full Time
S-694	Warehouse/Supply	Administration General Purpose	Full Time
S-697	Warehouse/Supply	General Purpose Warehouse	Full Time
S-699	Warehouse/Supply	General Purpose Warehouse	Full Time
S-700	Warehouse/Supply	Administration General Purpose	Full Time
804-913	Warehouse/Supply	Controlled Humidity Warehouse	Full Time
914-918	Warehouse/Supply	Controlled Humidity Warehouse	Full Time
919-923	Warehouse/Supply	Controlled Humidity Warehouse	Full Time
924-928	Warehouse/Supply	Controlled Humidity Warehouse	Full Time
929	Warehouse/Supply	Humidity Control Building	Full Time
930	Warehouse/Supply	Humidity Control Building	Full Time
931	Warehouse/Supply	Humidity Control Building	Full Time
932	Warehouse/Supply	Humidity Control Building	Full Time

TEAD-N

Directorate for Ammunition Operations

1300-R	Ammo. Demolition	Public Toilet	Full Time
1302	Ammo. Demolition	Ammunition Demil Facility	Full Time
1304	Ammo. Demolition	Ammunition Demil Facility	Full Time
S-1321	Ammo. Main. #3	Administration General Purpose	Full Time
1340-R	Igloo Storage W.	Public Toilet	Full Time
1372	Ammo. Main. #3	GM Maintenance Facility	Full Time
1373	Ammo. Main. #3	Ammunition Renv. Building	Full Time

<u>Building Number</u>	<u>Location</u>	<u>Functional Activity Description</u>	<u>Intensity of use</u>
1374	Ammo. Main. #3	Flam Mat Storage	Full Time
1375	Ammo. Main. #3	Ammunition Renv Shop	Full Time
1400	Rifle Range	Range House	Full Time
1344	Igloo Storage W.	Flam Mat Storage	Full Time
1345	Igloo Storage W.	Ammunition Renv Shop	Full Time
T-1346	Ammo. Demolition	Administration General Purpose	Full Time
1366	Ammo. Main. #3	Lunch Room	Full Time
1368	Ammo. Main. #3	Igloo Storage	Full Time
1369	Ammo. Main. #3	Igloo Storage	Full Time
1370	Ammo. Main. #31	Igloo Storage	Full Time
1371	Ammo. Main. #31	Igloo Storage	Full Time
A101- K1010	Igloo Storage (902 each)	Igloo Storage	Full Time

TEAD-S

Directorate for Ammunition Operations

S-	Admin	Change House	Full Time
S-118	Admin./Shops/Whse	FE Facility	Full Time
S-121	Admin./Shops/Whse	General Purpose Warehouse	Full Time
S-129	Admin./Shops/Whse	Gasoline Station With Building	Full Time
S-145	Admin./Shops/Whse	Diesel Fuel Station with Building	Full Time
S-220	Admin./Shops/Whse	General Purpose Warehouse	Full Time
S-221	Admin./Shops/Whse	General Purpose Warehouse	Full Time
S-222	Admin./Shops/Whse	General Purpose Warehouse	Full Time
S-223	Admin./Shops/Whse	General Purpose Warehouse	Full Time
S-301	Admin./Shops/Whse	Change House	Full Time
S-302	Admin./Shops/Whse	Lunch Room	Full Time
S-523	Open Storage/Ammo.	Ammunition Hut	Full Time
S-524	Open Storage/Ammo.	Ammunition Hut	Full Time
S-544	Open Storage/Ammo.	Laundry Facility	Full Time
551	Open Storage/Ammo.	High Explosive Mag	Full Time
552	Open Storage/Ammo.	High Explosive Mag	Full Time
553	Open Storage/Ammo.	Ammunition Maintenance Facility	Full Time
555	Open Storage/Ammo.	Change House	Full Time
701	Buffer Area NW	High Explosive Mag, Bk	Full Time
702	Buffer Area NW	High Explosive Mag, BK	Full Time
S-1002	Toxic Storage	Ammunition Hut	Full Time
S-2001	Toxic Storage	Ammunition Hut	Full Time
S-2002	Toxic Storage	Ammunition Hut	Full Time
S-2003	Toxic Storage	Ammunition Hut	Full Time
S-2004	Snop	Surveillance Workshop	Full Time
S-2005	Toxic Maintenance	Chemical Maintenance	Full Time
S-3001	CAMDS	Ammunition Hut	Full Time
S-3002	CAMDS	Ammunition Hut	Full Time
S-3102	CAMDS	Scale House	Full Time
68 ea	Igloo Toxic Stor.	Igloo Storage	Not in Use
140 ea	Igloo Toxic Stor.	Igloo Storage	Full Time
4001-4012	Toxic Storage	Inert Storehouse	Full Time
4051-4060	Toxic Storage	Inert Storehouse	Full Time
4101-4110	Toxic Storage	Inert Storehouse	Full Time

<u>Building Number</u>	<u>Location</u>	<u>Functional Activity Description</u>	<u>Intensity of use</u>
<u>DEPOT TENANTS</u>			
<u>Agency for International Development</u>			
Post Office	Salt Lake City	Office Administration	Full Time
<u>Atmospheric Science Laboratory Meteorological Team</u>			
3309	CAMDS	Office Administration	Full Time
3310	CAMDS	Maintenance Shop	Full Time
<u>U.S. Army Health Clinic</u>			
400	Medical	Office Administration	Full Time
400	Medical	Laboratory	Full Time
400	Medical	X-Ray	Full Time
400	Medical	Pharmacy	Full Time
400	Medical	Outpatient Clinic	Full Time
400	Medical	Ambulance Center	Full Time
400	Medical	Optometry Clinic	Full Time
400	Medical	Industrial Hygiene	Full Time
10 SA	Admin./Shops/Whse.	First Aid Station	Full Time
<u>Defense Property Disposal Office (DPDO)</u>			
830	DPDO (OPN-STG)	Open Storage Area	Full Time
831	DPDO (OPN-STG)	Open Storage Area	Full Time
840	DPDO (OPN-STG)	Open Storage Area	Full Time
841	DPDO (OPN-STG)	Open Storage Area	Full Time
850	DPDO (OPN-STG)	Open Storage Area	Full Time
851	DPDO (OPN-STG)	Open Storage Area	Full Time
860	DPDO (OPN-STG)	Open Storage Area	Full Time
861	DPDO (OPN-STG)	Open Storage Area	Full Time
862	DPDO (OPN-STG)	Open Storage Area	Full Time
870	DPDO (OPN-STG)	Open Storage Area	Full Time
871	DPDO (OPN-STG)	Open Storage Area	Full Time
872	DPDO (OPN-STG)	Open Storage Area	Full Time
625	DPDO	Paint Storage	Full Time
634	DPDO	Receiving and Shipping	Full Time
643	DPDO	Workshop	Full Time
644	DPDO	Administration Office	Full Time
645	DPDO	Receiving Warehouse	Full Time
646	DPDO	General Storage	Full Time
663	DPDO	General Storage	Full Time
664	DPDO	Storage - Sale Items	Full Time
2000	DPDO	Storage - Sale Items	Full Time
2001	DPDO	General Storage	Full Time
2002	DPDO	Storage - Property Waiting Shipment	Full Time
2003	DPDO	Storage - Sale Items	Full Time
2004	DPDO	General Storage	Full Time
2005	DPDO	General Storage	Full Time

<u>Building Number</u>	<u>Location</u>	<u>Functional Activity Description</u>	<u>Intensity of use</u>
2006	DPDO	General Storage	Full Time
<u>U.S. Army Communications Command</u>			
1	Administration #2	Administration Office	Full Time
1	Administration #2	Telephone Operations	Full Time
10	Administration #2	Tools and Parts Storage	Full Time
671	Warehouse/Supply	Telecommunications	Full Time
<u>USATSAR Mobile Rail Shop</u>			
502	Industrial	Administrative Office	Full Time
502	Industrial	Workshop Area	Full Time
671	Warehouse/Supply	Toos and Supplies Storage	Full Time
<u>U.S. Army Toxic and Hazardous Material Agency</u>			
1002	Administration #1	Administration Office	Full Time
<u>U.S. Army Reserves</u>			
S-101	Troop HSG/Support	Director of Reserve Component Hqtr.	Full Time
S-103	Troop HSG/Support	Chapel	Full Time
S-104	Troop HSG/Support	General Storage	Full Time
S-105	Troop HSG/Support	Classroom and Dayroom	Summer
S-106	Troop HSG/Support	CO Administration	Summer
S-107	Troop HSG/Support	To be demolished	Not in Use
108	Troop HSG/Support	Dining Facility	Summer
S-111	Troop HSG/Support	Barracks	Not in Use
S-112	Troop HSG/Support	Enlisted Quarters	Summer
S-113	Troop HSG/Support	Barracks	Not in Use
S-114	Troop HSG/Support	Enlisted Quarters	Summer
S-115	Troop HSG/Support	Barracks	Summer
S-116	Troop HSG/Support	Enlisted Quarters	Summer
S-117	Troop HSG/Support	Supply	Full Time
S-118	Troop HSG/Support	Barracks	Summer
S-119	Troop HSG/Support	Barracks	Summer
S-120	Troop HSG/Support	Barracks	Summer
S-121	Troop HSG/Support	Barracks	Summer
S-122	Troop HSG/Support	Barracks	Summer
S-123	Troop HSG/Support	Barracks	Summer
S-124	Troop HSG/Support	Barracks	Summer
S-125	Troop HSG/Support	Barracks	Summer
S-126	Troop HSG/Support	Barracks	Summer
S-130	Troop HSG/Support	Office and Dayroom	Summer
S-141	Troop HSG/Support	Motor Pool and General Storage	Summer
S-143	Troop HSG/Support	Director for Reserve Component Supply	Full Time
--	Rifle Range	Rifle Range	Summer
--	Buffer	Maneuver Area	Summer

APPENDIX B  
FLORA AND FAUNA OF THE TOOELE ARMY DEPOT

# FLORA AND FAUNA OF THE TOOELE ARMY DEPOT

## A. Flora

### 1. Planted Shade Trees and Shrubs<sup>172</sup>

#### 1.1 North Area

<u>Shade Trees</u>	<u>Number Planted</u>	<u>Shade Trees</u>	<u>Number Planted</u>
American Elm	12	Osage Orange	4
Black Locust	1,036	Rocky Mountain Juniper	53
Black Willow	8	Russian Olive	717
Colorado Blue Springs	91	Siberian Elm	386
Cottonwood	24	Thornless Honey Locust	48
Engleman Spruce	6	Utah Juniper	291
Green Ash	94	White Poplar	7
Norway Maple	22		
<u>Shrubs</u>		<u>Shrubs</u>	
Arborvitae	4	Squaw Bush	60
Common Lilac	6	Tamarisk	40
Phitzer Juniper	224		

#### 1.2 South Area

<u>Shade Trees</u>		<u>Shade Trees</u>	
American Elm	56	Golden Willow	21
Bartlett Pear	25	Green Ash	246
Black Locust	78	Maple	12
Canadian Poplar	37	Mugho Pine	2
Chinese Apricot	7	Ponderosa Pine	17
Chinese Elm	180	Rocky Mountain Red Cedar	177
Chinese Juniper	16	Russian Olive	173
Colorado Blue Spruce	229	Silver Poplar	1
Cottonwood	3	Thornless Honey Locust	95
Eastern Red Cedar	62	Utah Juniper	13
<u>Shrubs</u>		<u>Shrubs</u>	
Arborvitae	3	Pyracantha	24
Barberry	19	Rock Cotoneaster	10
Buffalo Berry	47	Snowberry	112
Common Lilac	77	Sorbaria	13
Cranberry	4	Spirea	27
Dogwood	8	Squaw Bush	228
Golden Bell	15	Staghorn Sumac	27
Mulberry	12	Tamarisk	69
Peking Cotoneaster	15	Tartarian Honeysuckle	40
Privet	12	Wild Rose	51

## 2. Other Flora Probably Present at the Tooele Army Depot<sup>173</sup>

### 2.1 North Area

#### Desert Bench Range

<u>*Agropyron spicatum</u>	Bluebunch Wheatgrass
<u>*Artemisia Spinescens</u>	Budsage
<u>Artriplex canescens</u>	Four wing saltbrush
<u>*Artriplex confertifolia</u>	Shadscale
<u>Bromus rubens</u>	Foxtail chess
<u>Bromus tectorum</u>	Cheatgrass
<u>Chrysothamus nauseosus</u>	Rubber rabbitbrush
<u>Descarania pinnata</u>	Tansy mustard
<u>Distichlis spicatum</u>	Saltgrass
<u>Eructia lanta</u>	Winterfat
<u>Graytia spinosa</u>	Hopsage
<u>*Halogeton glomeratus</u>	Halogeton
<u>Happlopoppus rydbergil</u>	Goldenweed
<u>*Kockia american</u>	Gray molly
<u>Lepidium montanum</u>	Pepperweed
<u>Leptadactylon pungens</u>	Indian ricegrass
<u>Oryzopsis hymenoides</u>	Russian thistle
<u>Salsoa Kali</u>	Globemallow
<u>*Sphaeralcea munrona</u>	Squirreltail
<u>Sitanion hystrix</u>	Alkali sacaton
<u>Sporobolus airoides</u>	Needle and thread grass
<u>Stipa comata</u>	Inkweed
<u>Suaeda torreyana</u>	Spiny horsebrush
<u>Tetradymia spinescens</u>	Skinner's snakeweed
<u>Xanthocephalum sarothrae</u>	

Desert Bench on valley floor of wash:

<u>*Atriplex confertifolia</u>	Shadscale
<u>*Kochia americana</u>	Gray molly
<u>Sarcobatus vermiculatus</u>	Greasewood
<u>Suaeda torreyana</u>	Inkweed

Desert Bench on lowest part of valley floor where water stands after rain:

<u>Sarcobatus vermiculatus</u>	Greasewood
<u>Suaeda torreyana</u>	Inkweed

Planted:

Spiked wheatgrass  
Crested wheatgrass

## Sandy Hills Range

<u>*Artemisia arbuscula</u>	Low sagebrush
<u>Artemisia spinescens</u>	Bud sage
<u>Artemisia tridentata</u>	Big sagebrush
<u>*Artriplex confertifolia</u>	Shadscale
<u>Astragalus beckwithii</u>	Locoweed
<u>Astragalus mollissimus</u>	
<u>Bromus tectorum</u>	Cheatgrass
<u>Calochortus nuttallii</u>	Sego Lily
<u>Camissonia boothii</u>	
<u>Camissonia scapoidea</u>	
<u>Castilleja angustifolia</u>	Indian paintbrush
<u>Castilleja chromosa</u>	Desert Indian paintbrush
<u>Chaenactis douglassi</u>	
<u>Cleome lutea</u>	Yellow Rocky Mountain beeplant
<u>Chrysothamnus nauseosus</u>	Rubber rabbitbrush
<u>Cryptantha recurvata</u>	
<u>Delphinium nuttallianus</u>	Low larkspur
<u>*Ephedra nevadensis</u>	Mormon tea
<u>Erigeron pumilus</u>	Fleabane
<u>Erogenium ovalifolium</u>	
<u>Erysimum asperum</u>	Wallflower
<u>Erysimum repandrum</u>	Wormseed
<u>Gilia leptomeria</u>	
<u>Gilia sinuata</u>	
<u>*Grayia spinosa</u>	Hopsage
<u>Juniperus osteosperma</u>	Little Utah juniper
<u>Lupinus argenteus</u>	Silvery lupine
<u>Lupinus pusillus</u>	Rusty lupine
<u>Marrubium vulgare</u>	Common horehound
<u>Mentzelia laevicaulis</u>	Blazing star
<u>*Oryzopsis hymenoides</u>	Indian ricegrass
<u>Phacelia crenulata</u>	
<u>Phlox hoodii</u>	
<u>Senecio multilobatus</u>	Groundsel
<u>Spaeralcea munroana</u>	Globemallow
<u>*Sporobolus cryptandrus</u>	Sand dropseed
<u>Stanleya pinnata</u>	Princeplume
<u>Stephanomeria exigua</u>	Wirelettuce
<u>*Stipa comata</u>	Needle and thread grass
<u>*Tetradymia glabrata</u>	Littleleaf horsebrush
<u>*Xanthocephalum sarothrae</u>	Shinners snakeweed

## Sandy Hill Range - Isolated Areas

<u>Artemisia spinescens</u>	Budsage
<u>Artriplex confertifolia</u>	Shadscale
<u>Artriplex canescens</u>	Four wing saltbrush
<u>Bromus tectorum</u>	Cheatgrass
<u>Chrysothamnus viscidiflorus</u>	Rabbitbrush
<u>Grayia spinosa</u>	Hopsage
<u>Kochia americana</u>	Gray molly
<u>Lepidium perfoliatum</u>	Peppergrass

Oryzopsis hymenoides  
Sarcobatus vermiculatus  
Sporobolus airoides  
Suaeda torreyana  
Tetradymia spinosa

Indian ricegrass  
Greasewood  
Alkali sacaton  
Inkweed  
Spiny horsebrush

Planted:

Agropyron crislatum

Crested wheatgrass

Foothill Range

\*Archillae millefolium  
Agropyron crislatum  
\*Agropyron smithii  
Agropyron spicatum  
\*Artemisia arbuscula  
Artemisia tridentata  
Astragalus spp  
Balsamorhiza sagittata  
Bromus tectorum  
Calochortus nuttallii  
Chenopodium album  
Chrysothamus nauseosus  
Chrysothamus viscidiflorus  
Eriogonum spp  
Erodium cicutarium  
Grindelia squarrosa  
Gutierrezia sarothrae  
Halogeton glomeratus  
\*Hedysarum boreale  
Helianthus annuus  
Lactuca scariola  
Lepidium perfoliatum  
\*Oryzopsis hymenoides  
Phlox hoodi  
Poa sandbergii  
Purshia tridentata  
Salsola kali  
Sisymbrium altissimum  
\*Stipa comata  
Symphoricarpos spp  
Verbascum thapsus  
Viola beckwithii  
Wyethia amplexicaulis  
Xanthocephalum sarothrae  
Zygadenus paniculatus

Yarrow  
Crested wheatgrass  
Western wheatgrass  
Bluebunch wheatgrass  
Low sagebrush  
Big sagebrush  
Locoweed  
Narrowleaf balsam root  
Cheatgrass  
Sego lily  
Common lambsquarters  
Rubber rabbitbrush  
Rabbitbrush  
Buckwheat  
Heron's bill  
  
Machbrush  
Halogeton  
Sweet Dutch  
Sunflower  
Prickly lettuce  
Peppergrass  
Indian ricegrass  
Phlox  
Native bluegrass  
Bitterbrush  
Russian thistle  
Tumbling mustard  
Needle and thread grass  
Snowberry  
Common mullein  
Sagebrush violet  
Dwarf sunflower  
Skinners snakeweed  
Death camas

Planted

Crested Wheatgrass  
\*Spiked wheatgrass  
\*Western wheatgrass

## Upland Loam

Argroseris glauca  
 \*Argropyron oristatum  
 \*Argropyron smithii  
Argropyron spicatum  
 \*Argropyron sp  
Allium acuminatum  
Artostoda longiseta  
Artemisia arbuscula  
 \*Artemisia tridentata  
Astragalus spp  
Artiplex confertifolia  
Balsamorhiza sagittata  
 \*Bromus tectorum  
Calochortus nuttallii  
 \*Castilleja chromosa  
 \*Chrysothamnus viscidiflorus  
Delphinium barbeyi  
Erigeron spp  
 \*Frizonium  
 \*Grayia spinosa  
Gutierrezia sarothrae  
Hilaris jamesii  
 \*Hedysorum boreale  
 \*Lupinus argenteus  
Koeleria cristata  
 \*Oryzopsis hymenoides  
Phlox hoodii  
 \*Poa sandbergii  
Purshia tridentata  
Sitanion hystrix  
Sporobolus airoides  
 \*Stipa comata  
Symphoricarpos spp  
 \*Vicia  
Viola beckwithii  
 \*Vulpia octiflora  
Wyethia amplexicaulis  
Xanthocephalum sarothrae  
Zygadenus paniculatus

False dandelion  
 Crested wheatgrass  
 Western wheatgrass  
 Bluebunch wheatgrass  
 Spiked wheatgrass  
 Wild onion  
 Dogtown grass  
 Low sagebrush  
 Big sagebrush  
 Locoweed  
 Shadscale  
 Narrow leaf balsam root  
 Cheatgrass  
 Sego lily  
 Rubber rabbitbrush  
 Rabbitbrush (yellow brush)  
 Tall larkspur  
 Buckwheat

Hopsage  
 Matchbrush  
 Galletagrass  
 Sweet vetch  
 Silvery lupine  
 Junegrass  
 Indian ricegrass  
 Phlox  
 Nature bluegrass  
 Bittergrass  
 Squirreltail grass  
 Alkali sacaton  
 Needle and thread grass  
 Snowberry  
 Bitter vetch  
 Sagebrush violet  
 Fescue  
 Dwarf sunflower  
 Skinners snakeweed  
 Death camas

Planted:

Western wheatgrass  
 Crested wheatgrass

## Disturbed Roadsides

Ambrosia acanthocarpa  
Bassia hyssopifolia  
 \*Bromus tectorum  
Grindelia squarrosa

Annual bursage  
 Cheatgrass  
 Gumweed

Erodium cicutarium  
Halogeton glomeratus  
Helianthus annuus  
Horedum jubatum  
Iva axillaris  
Lepidium perfoliatum  
Polygonum aviculare  
Salsola kali  
Verbena bracteata

Heron'sbill  
 Sunflower  
 Foxtail barley  
 Sumpweed  
 Peppergrass  
 Knotweed  
 Russian thistle  
 Big bract verbena

#### Sewage Lagoon

Bassia hyssopifolia  
Chara  
Cirsium arvense  
Distichlis spicata  
Ephilobium glandulosum  
Myriophyllum spicatum  
Scirpus acutus  
Scirpus maritimus  
Scirpus pungens  
Tamarix ramosissima  
Thelypodopsis elegans  
Triticum aestivum  
Typha domingensis  
Typha latifolia

Thistle  
 Saltgrass  
 Northern willow weed  
 Water mifoil  
 Bigsteam bulrush  
 Alkali bulrush  
 Common three square  
 Tamarisk  
 Wheat  
 Narrowleaf cattail  
 Common cattail

#### 2.2 South Area

Agoseris glauca  
Agrophron spicatum  
Agrophyron cristatum  
 \*Agropyron sp  
Allium acuminatum  
 \*Atriplex confertifolia  
Atriplex gardneri  
Atremisia spp  
 \*Artemisia tridentata  
Artemisia spinescens  
Balsamorhiza sagittata  
Bromus tectorum  
Chrysothamus nauseosus  
Chrysothamus vicidflorus  
 \*Chrysothamus vicidflorus lanceolatus  
Descurainia pinnata  
Distichlis spicata  
Ephedra nevadensis  
Eriogonum spp  
Eurotia lanta  
Gutierrezia sarothrae  
Halogeton glomeratus  
Juniper osteosperma  
Kochia americana  
Lepidium peafoliatum

False dandelion  
 Bluebunch wheatgrass  
 Crested wheatgrass  
 Spiked wheatgrass  
 Wild onion  
 Shadscale  
 Saltbush  
 Black sagebrush, fringed sagebrush  
 Big sagebrush  
 Budsage  
 Balsam root  
 Cheatgrass  
 Rubber rabbitbrush  
 Big rabbitbrush  
 Yellow brush  
 Tansy mustard  
 Saltgrass  
 Ephedra  
 Buckwheat  
 Winterfat  
 Matchbrush  
 Halogeton  
 Juniper  
 Gray molly  
 Peppergrass

\*Oryzopsis hymenoids  
Poa sandbergii  
Salsola Kali  
\*Sarcobatus vermiculatus  
Sisymbrium altissimum  
\*Sitanion hystrix  
Sporobolus airoides  
Stipa comata  
Suaeda torreyana  
Symphoricarpos spp  
Viola beckwithii  
Wyethia amplexicaulis  
Zygodenum paniculatus

Indian ricegrass  
 Bluegrass  
 Russian thistle  
 Greasewood  
 Tumble mustard  
 Squirreltail grass  
 Alkali sacaton  
 Needle and thread grass  
 Inkweed  
 Snowberry  
 Sagebrush violet  
 Dwarf sunflower  
 Death camera

#### Disturbed Roadsides

Amprosia acanthrocarpa  
Bassia hyssopifolia  
\*Bromus tectorum  
Grindelia squarrosa  
Erodium cicutarium  
Halogeton glomeratus  
Heliopsis annuus  
Hordeum jubatum  
Iva axillaris  
Lepidium perfoliatum  
Polygonum aviculare  
\*Salsola kali  
\*Verbena bracteata

Annual Bursage  
 Cheatgrass  
 Gumweed  
 Heronsbill  
 Sunflower  
 Foxtail barley  
 Sumpweed  
 Peppergrass  
 Knotweed  
 Russian thistle  
 Big bract verbena

#### Sewage Lagoon

Bassia hyssopifolia  
Chara (green algae)  
Cirsium arvense  
Distichlis spicata  
Epilobium glandulosum  
Myriophyllum spicatum  
Scirpus actus  
Scirpus maritimus  
\*Scirpus pungens  
Tamarix ramosissima  
Thelypodopsis elegans  
Triticum aestivum  
Typha domingensis  
Typha latifolia

Thistle  
 Saltgrass  
 Northern willow weed  
 Water Milfoil  
 Bigstem bulrush  
 Alkali bulrush  
 Common three square  
 Tamarisk  
 wheat  
 Narrowleaf cattail  
 Common cattail

#### B. Fauna Probably Inhabiting TEAD North and South<sup>174</sup>

##### Mammals

Ammospermophilus leucurus  
Antrozous pallidus

Antelope ground squirrel  
 Pallid bat

Canis latrans  
Depodomys microps  
Dipodomys ordii  
Eptesicus fuscus  
Erethizon dorsatum  
Eudrema masculatum  
Eutamias dorsalis  
Eutamias minimus  
Langurus curtatus  
Lepus californicus  
Lynx rufus  
Microdipodops megacephalus  
Microtus montanus  
Mus musculus  
Myotis lucifugus  
Myotis leibii  
Neotoma lepida  
Obocoileus hemionus  
Onychomys leucogaster  
Perognathus formosus  
Perognathus paryus  
Peromyscus arinitus  
Peromyscus maniculatus  
Peromyscus trueii  
Rattus norvegicus  
Reithrodontomys megalotis  
Sorex merriami  
Spermophilus variegatus  
Spermophilus townsendii  
Spilogale putoris  
Sylvilogus audubonii  
Sylvilogus nuttallii  
Tadarida brasiliensis  
Thomomys talpoides  
Urocyon cinereoargenteus  
Vulpes macrotis  
Vulpes vulpes  
Zapus princeps

Coyote  
 Great basin kangaroo rat  
 Ord's kangaroo rate  
 Big brown bat  
 Porcupine  
 Spotted bat  
 Cliff chipmunk  
 Least chipmunk  
 Sagebrush vole  
 Blacktailed jackrabbit  
 Bobcat  
 Dark kangaroo mouse  
 Mountail vole  
 House mouse  
 Little brown myotis  
 Small footed myotis  
 Desert wood rat  
 Mule deer  
 Northern grasshopper mouse  
 Long-tailed pocket mouse  
 Great basin pocket mouse  
 Canyon mouse  
 Deer mouse  
 Pinyon mouse  
 Norway rat  
 Western harvest mouse  
 Merrimams shrew  
 Rock squirrel  
 Townsend ground squirrel  
 Spotted skunk  
 Desert cottontail  
 Mountain cottontail  
 Brazilian free-tailed bat  
 Northern pocket gopher  
 Gray fox  
 Kit fox  
 Red fox  
 Western jumping mouse

#### Reptiles

Cnemidophorus tessclatus  
Crotalus viridis  
Crotaplytus wislyenii  
Masticophis lateralis  
Phrynosoma platyrhinos  
Pitouphis catenifer  
Scebpurus graciosus  
Uta stansburiana

Tesselate race runner  
 Great basin rattlesnack  
 Leopard lizard  
 Western striped lizard  
 Desert horned lizard  
 Great basin gopher snake  
 Sagebrush lizard  
 Side blotched lizard

#### Amphibians

Scaphious nammondii

Spadefoot toad

## Swans, Geese, Ducks

<u>Aechmophorus occidentalis</u>	Western Grebe	SR-U
<u>Aix sponsa</u>	Wood duck	A
<u>Anas americana</u>	American widgeon	TR-R-C
<u>Anas carolinensis</u>	Green winged teal	TR-WR-A
<u>Anas cyanoptera</u>	Cinnamon teal	TR-SR-C
<u>Anas clypeta</u>	Northern shoveler	R-TR-C
<u>Anas discors</u>	Blue winged teal	TR-SR-U
<u>Anas platyrhynchos</u>	Mallard	TR-C
<u>Anas strepera</u>	Gadwall	TR-R-C
<u>Anser albifrons</u>	Greater white-fronted goose	TR-U
<u>Aythya affinis</u>	Lesser scaup	TR-U
<u>Aythya americana</u>	Red head	SR-TR-U
<u>Aythya collaris</u>	Ring necked duck	TR-U
<u>Aythya marila</u>	Greater scaup	TR-U
<u>Aythya valisineria</u>	Canvasback	TR-U
<u>Branta canadensis</u>	Canadian goose	TR-U
<u>Bucephala albeola</u>	Bufflehead	TR-WR-C
<u>Bucephala islandica</u>	Barrow's goldeneye	TR
<u>Chen caerulescens</u>	Snow goose	WR-U
<u>Cygnus columbianus</u>	Whistling swan	TR-WR-U
<u>Mergus merganser</u>	Common merganser	TR-WR-C
<u>Oxyura jamaicensis</u>	Ruddy duck	SR-TR-C
<u>Podiceps auritus</u>	Horned grebe	TR-U
<u>Podiceps nigricollis</u>	Eared grebe	SR-C
<u>Podilymbus podiceps</u>	Pied-billed grebe	SR-U

## American Vulture

Cathartes aura	Turkey vulture	SR-U
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## Hawks, Harrier

<u>Accipiter cooperii</u>	Copper's hawk	SR-TR-U
<u>Accipiter gentilis</u>	Goshawk	R-TR-U
<u>Accipiter striatus</u>	Sharp-shinned hawk	R-TR-C
<u>Aquila chrysaetos</u>	Golden eagle	R-C
<u>Buteo jamaicensis</u>	Red-tailed hawk	R-VU
<u>Buteo lagopus</u>	Rough-legged hawk	WR-U
<u>Buteo regalis</u>	Ferruginous hawk	R-C
<u>Buteo swainsoni</u>	Swainson's hawk	SR-U
<u>Circus cyaneus</u>	Northern harrier	R-C
<u>Haliaeetus leucocephalus</u>	Bald eagle	WR-C

## Falcons

Falco columbarius	Martin	TR-R
Falco mexicanus	Prairie falcon	R-C
Falco peregrinus	Peregrin falcon	A-R
Falco sparverius	Kestrel	R-TR-C

## Grouse

<u>Bonasa umbellus</u>	Ruffed grouse	R-C
<u>Centrocercus urophasianus</u>	Safe grouse	R-C
<u>Dendragapus obscurus</u>	Blue grouse	R-U
<u>Tympanuchus phasianellus</u>	Sharp-tailed grouse	R-U

## Quails

<u>Alectrois chukar</u>	Chukar	R-C
<u>Lophortyx gambelii</u>	Gambel's quail	R-U
<u>Phasianus colchicus</u>	Ring-necked pheasant	R-C

## Cranes

<u>Grus canadensis</u>	Sandhill crane	TR-SR-U
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## Hérons, Bitterens

<u>Ardea herodias</u>	Great blue heron	SR-U
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## Rail, Coot

<u>Cotuericops noveboracensis</u>	Yellow rail	SR-U
<u>Fulica americana</u>	American coot	R-TR-C
<u>Porzana carolina</u>	Sora	SR-C
<u>Rallus limicola</u>	Virginia rail	SR-TR-C

## Stilt, Avocet

<u>Himantopus mexicanus</u>	Black-necked stilt	TR-SRU-U
<u>Recurvirostra americana</u>	American avocet	TR-SR-C

## Plovers

<u>Charadrius alexandrinus</u>	Snowy plover	SR-TR-C
<u>Charadrius montanus</u>	Mountain plover	A-X
<u>Charadrius semiplamatus</u>	Semi-palmated plover	TR-U
<u>Charadrius vociferus</u>	Killdeer	R-TR-VC
<u>Pluvialis squatarola</u>	Black-bellied plover	TR-C

## Sandpipers, Phalaropes

<u>Actitis macularia</u>	Spotted sandpiper	SR-TR-C
<u>Calidris alba</u>	Sanderling	TR-U
<u>Calidris mauri</u>	Western sandpiper	TR-U
<u>Calidris melanotos</u>	Pectoral sandpiper	TR-U
<u>Calidris minutilla</u>	Least sandpiper	TR-U
<u>Cataptrophorus semipalmatus</u>	Willet	SR-TR-U
<u>Capella gallinago</u>	Common snipe	R-C
<u>Limnodromus scolopaceus</u>	Long-billed dowitcher	TR-C
<u>Limosa fedoa</u>	Marbled godwit	TR-C
<u>Numenius americanus</u>	Long-gellied curlew	SR-TR-U

<u>Phalaropus lobatus</u>	Northern phalarope	TR-U
<u>Phalaropus tricolor</u>	Wilson's phalarope	TR-SR-C
<u>Tringa flavipes</u>	Lesser yellowlegs	TR-U
<u>Tringa Melanoleucus</u>	Greater yellowlegs	TR-U
<u>Tringa Solitaria</u>	Solitary sandpiper	SR-TR-U

#### Gulls, Terns

<u>Chlidonias niger</u>	Black terns	TR-SR-C
<u>Larus argentatus</u>	Herring gull	A-X
<u>Larus californicus</u>	California gull	TR-SR-C
<u>Larus delawarensis</u>	Ring-billed gull	TR-WR-C
<u>Larus pipixcan</u>	Franklin's gull	TR-SR-C
<u>Sterna caspia</u>	Caspian tern	TR-SR-U
<u>Sterna forsteri</u>	Forster's tern	TR-SR-C

#### Pigeon, Dove

<u>Columba livia</u>	Rock pigeon	R-C
<u>Zenaida macroura</u>	Mourning dove	TR-SR-C

#### Owls

<u>Aegolius acadicus</u>	Saw whet owl	R-U
<u>Asio flammeus</u>	Short-eared owl	R-C
<u>Asio otus</u>	Long-eared owl	R-C
<u>Athene cunicularia</u>	Burrowing owl	R-U
<u>Bubo virginianus</u>	Great horned owl	R-C
<u>Glaucidium gnoma</u>	Pygmy owl	TR-U
<u>Otus asio</u>	Screech owl	R-C
<u>Otus flammeolus</u>	Flammulated owl	TR-U
<u>Tyto alba</u>	Barn owl	R-C

#### Nighthawk, Poorwill

<u>Chordeiles minor</u>	Common nighthawk	SR-TR-U
<u>Phalaenoptilus nuttallii</u>	Poorwill	SR-C

#### Swifts

<u>Aeronautes saxatalis</u>	White-throated swift	SR-C
<u>Cypseloides niger</u>	Black swift	SR-U

#### Hummingbirds

<u>Archilochus alexandri</u>	Black-chinned hummingbird	SR-C
<u>Stellula calliope</u>	Calliope hummingbird	TR-U
<u>Selasphorus rufus</u>	Rufous hummingbird	TR-U

#### Kingfisher

<u>Ceryle alcyon</u>	Belted kingfisher	R-U
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## Woodpeckers

<u>Asyndesmus lewis</u>	Lewis woodpecker	R-C
<u>Colaptes auratus</u>	Common flicker	R-C
<u>Picoides pubescens</u>	Downey woodpecker	R-C
<u>Picoides villosus</u>	Hairy woodpecker	R-U
<u>Sphyrapicus varius</u>	Yellow-bellied sapsucker	R-C

## Tyrant Flycatchers

<u>Contopus borealis</u>	Olive sided flycatcher	SR-U
<u>Contopus sordidulus</u>	Western wood pewee	SR-U
<u>Empidonas oberholseri</u>	Dusty flycatcher	SR-U
<u>Empidonax traillii</u>	Traill's flycatcher	SR-U
<u>Empidonax wrightii</u>	Gray flycatcher	SR-C
<u>Eremophila alpestris</u>	Horned lark	R-VC
<u>Myiarchus cinerascens</u>	Ash-throated flycatcher	SR-C
<u>Sayornis saya</u>	Say's phoebe	SR-C
<u>Tyrannus verticalis</u>	Western kingbird	SR-C
<u>Tyrannus vociferans</u>	Cassin's kingbird	SR-U
<u>Tyrannus tyrannus</u>	Eastern kingbird	SR-C

## Swallows

<u>Hirundo rustica</u>	Barn swallow	SN-TR-C
<u>Iridoprocne bicolor</u>	Tree swallow	SR-U
<u>Petrochelidon pyrrhonata</u>	Cliff swallow	SR-U
<u>Ripatria riparia</u>	Bank swallow	SR-U
<u>Stelgidopteryx ruficollis</u>	Rough-winged swallow	SR-TR-U
<u>Tachycineta thalassina</u>	Violet green swallow	SR-C

## Jays, Magpie, Crows

<u>Apelocoma coerulescens</u>	Scrub jay	R-C
<u>Corvus brachyrhynchos</u>	Common crow	SR-U
<u>Corvus corax</u>	Common raven	R-VC
<u>Cyanocitta stelleri</u>	Steller's jay	R-C
<u>Gymnorhinus cyanocephalus</u>	Pinyon jay	R-C
<u>Nucifraga columbiana</u>	Clark's nutcracker	TR-U
<u>Perisoreus canadensis</u>	Gray jay	R-U
<u>Pica pica</u>	Black-billed magpie	R-C

## Chickadees, titmouse

<u>Parus atricapillus</u>	Black capped chickadee	R-C
<u>Parus gambeli</u>	Mountain chickadee	R-U
<u>Parus inornatus</u>	Plain titmouse	R-VC
<u>Psaltiriparus minimus</u>	Common bushtit	R-U

## Nuthatches

<u>Sitta canadensis</u>	Red-breasted nuthatch	R-U
<u>Sitta carolinensis</u>	White-breasted nuthatch	R-C

	Creeper	
<i>Certhia familiaris</i>	Brown creeper	WR-U
	Wrens	
<u><i>Castrophaes mexicanus</i></u>	Canon wren	R-U
<u><i>Salpinctes obsoletus</i></u>	Rock wren	R-SR-C
<u><i>Thryomanes bewickii</i></u>	Bewick's wren	SR-U
	Mockingbird, Thrasher	
<u><i>Dumetella carolinensis</i></u>	Gray catbird	R-C
<u><i>Mimus polyglottos</i></u>	Mockingbird	TR-R-U
<u><i>Oreoscoptes montanus</i></u>	Sage thrasher	SR-C
<u><i>Toxostoma bendirei</i></u>	Bendire's thrasher	R-X
	Thrushes	
<u><i>Catharus fuscenscens</i></u>	Velry	SR-U
<u><i>Catharus guttatus</i></u>	Hermit thrush	SR-TR-C
<u><i>Myadestes townsendi</i></u>	Townsend's solitaire	R-U
<u><i>Sialia mexicana</i></u>	Western bluebird	SR-TR-U
<u><i>Turdus migratorius</i></u>	American robin	R-C
	Kinglets	
<u><i>Regulus calendula</i></u>	Ruby-crowned kinglet	R-U
<u><i>Regulus satrapa</i></u>	Golden-crowned kinglet	R-U
<u><i>Polioptila caerulea</i></u>	Blue-gray gnatcatcher	SR-C
	Maxwings	
<u><i>Bombycilla cedrorum</i></u>	Cedar waxwing	R-U
<u><i>Bombycilla garrulus</i></u>	Bohemian waxwing	WR-U
	Starling	
<u><i>Sturnus vulgaris</i></u>	European starling	R-C
	Shrikes	
<u><i>Lanius excubitor</i></u>	Norther shrike	WR-U
<u><i>Lanius ludovicianus</i></u>	Loggerhead shrike	SR-C
	Vireos	
<u><i>Vireo gilvus</i></u>	Warbling vireo	SR-U
<u><i>Vireo olivaceus</i></u>	Red-eye vireo	TR-U
<u><i>Vireo solitarius</i></u>	Solitary vireo	SR-U

## Wood Warblers

<u>Dendroica coronata</u>	Yellow-rumped warbler	SR-U
<u>Dendroica nigrescens</u>	Black-throated gray warbler	SR-C
<u>Dendroica petechia</u>	Yellow warbler	SR-U
<u>Geothlypis trichas</u>	Common yellowthroat	SR-U
<u>Icteria virens</u>	Yellow-breasted chart	SR-U
<u>Oporornis agilis</u>	Connecticut warbler	A-X
<u>Oporornis tolmiei</u>	MacGillivray's warbler	SR-U
<u>Vermivora celata</u>	Orange-crowned warbler	SR-U
<u>Vermivora virginiae</u>	Virginia's warbler	SR-C
<u>Wilsonia pusilla</u>	Wilson's warbler	SR-U

## Weaver Finch

<u>Passer domesticus</u>	House sparrow	R-VC
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## Blackbirds, Orioles

<u>Agelaius phoeniceus</u>	Red-winged blackbird	R-U
<u>Dolichonyx oryzivorus</u>	Boblink	SR-U
<u>Euphagus cyanocephalus</u>	Brewer's blackbird	R-U
<u>Icterus bullockii</u>	bullock's oriole	SR-U
<u>Icterus parisorum</u>	Scott's oriole	SR-U
<u>Molothru ater</u>	Brown-headed cowbird	SR-C
<u>Sturnella neglecta</u>	Western meadowlark	R-VC
<u>Xanthocephalus xanthocephalus</u>	Yellow-headed blackbird	R-C

## Tanager

<u>Piranga ludoviciana</u>	Western Tanager	SR-O
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## Grosbeak, Finches, Buntings

<u>Ammordramus savannarum</u>	Grasshopper sparrow	A-X
<u>Amphispiza bilineata</u>	Black-throated sparrow	SR-U
<u>Calamospiza melanocorys</u>	Lark bunting	TR-U
<u>Carduelis pinus</u>	Pine siskin	R-C
<u>Carduelis psaltria</u>	Lesser goldfinch	R-C
<u>Carduelis tristis</u>	American goldfinch	R-U
<u>Carpodacus cassinii</u>	Cassin's finch	SR-U
<u>Carpodacus mexicanus</u>	House finch	R-VC
<u>Chondestes grammacus</u>	Lark sparrow	SR-C
<u>Coccothraustes vespertina</u>	Evening grosbeak	SR-U
<u>Junco caniceps</u>	Gray-headed junco	SR-U
<u>Junco hyemalis</u>	Dark-eyed junco	R-C
<u>Leucosticte atrata</u>	Black rosy finch	R-U
<u>Leucosticte tephrocotis</u>	Gray-crowned rosy finch	WR-C
<u>Loxia curvirostra</u>	Red crossbill	WR-U
<u>Melospiza melodia</u>	Song sparrow	R-U
<u>Passerculus</u>	Savana sparrow	SR-U
<u>Passerina amoena</u>	Lazuli bunting	SR-U
<u>Pheucticus melanocephalus</u>	Black-headed grosbeak	SR-U
<u>Pinicola enucleator</u>	Pine grosbeck	R-U

Pipilo chlorura  
Pipilo erythrophthalmus  
Peoecetes gramineus  
Sipizella arborea  
Sipizella breweri  
Sipizella passerina  
Zonotricha leucophrys

Green-tailed towhee	R-C
Rufus-sided towhee	R-C
Vesper sparrow	SR-C
Tree sparrow	WR-U
Brewer's sparrow	SR-C
Chipping sparrow	SR-U
White-crowned sparrow	R-C

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- (17) Tooele Army Depot, "Land Management Plan for Tooele Army Depot and South Area Activity," Tooele, Utah, March, 1975.  
(18) Beverly J. Albee, op. cit.

175. SR = summer resident; WR = water resident; TR = Transient; R = resident; A = accidental; C = common; VC = very common; U = uncommon; and X = rare.

## FINDING OF NO SIGNIFICANT IMPACT (FNSI)

A. NAME OF ACTION: Operation of TEAD North and South Areas, Tooele, Utah.

B. BRIEF DESCRIPTION OF ACTION: TEAD consists of two areas, North and South, there are 9 Directorates and 8 Tenant Units associated with the Depot. TEAD is a major ammunition storage and equipment maintenance installation. The primary directorate activities on the Depot are:

1. The design development, and testing of ammunition peculiar equipment.
2. Demilitarization tests on ammunition and recycling of explosives.
3. Development of new procedures to demilitarize chemical agents and limited demilitarization of chemical agents, and testing of chemical/agents.
4. Overhauling and rebuilding of automotive and combat equipment, missile systems, fire control equipment, power generators, rail equipment, etc.
5. Demilitarization of small arms ammunition and explosives.
6. Maintenance of toxic chemical munitions.

The tenant activities are responsible for:

1. Weather monitoring for the CAMDS area.
2. Disposal of hazardous waste (DPDO).
3. Direct and general maintenance support of rail equipment users in the western states.
4. U.S. Army Reserve Training in the summer.
5. Assisting sampling and advising in the demilitarization of chemical munitions.

C. ANTICIPATED ENVIRONMENTAL EFFECTS: The continued operation of TEAD will leave very little adverse effect on the environment. The impact on geology, mineral resources and soils will be very minor. The topography and drainage will not be affected. The air quality will be affected to a small degree but all emissions are within state and federal air pollution standards so the effect will not be adverse. Water resources and water quality will not be significantly affected. There will be no adverse effects to the flora or fauna. The noise levels at TEAD are not detrimental.

\*Due to the large percentage of the local population being employed by or in indirect support of the depot, the only significant economic effect would result from closure of the Depot. This is not planned so will be of no consequence.

D. CONCLUSIONS LEADING TO THIS FNSI:

1. The air quality will not change significantly.
2. The amount and quality of the water will not be damage.

3. The flora and fauna will not be adversely affected.
4. The local populations and economy will not be adversely affected.
5. Ammunition, including chemical ammunition operations, disassembly, and sampling will have no adverse affect on the environment.

Therefore, there is a finding of no significant impact.